

The independent Dragon magazine

95p US$3.25 May 1986

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Arcade Arena

Kung Fu — The Master 20 games to be won

I IRONSTONE

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ABC

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How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Contents



Editorial

AT LAST — the sun shines, the warm breezes blow, the bulbs begin to sprout — and early evening TV has got just that little bit worse. It can mean only one thing. Spring has finally arrived . . . and with it, the promise of a flurry of activity for the Dragon and its kin.

As far as events go, we've already had the Dragon "Weekend in Wales" (a moderate success by all accounts) and then there's the Microdeal "6809 Convention" held only a couple of weeks ago (expect a full report next issue). There's the John Penn show in Leeds coming up soon. But that's not all.

Quite a bit of new software seems about to become available. Incentive's Time Lord is well on the way (with mysterious rumours of a new mega-game written by Eddie Steady Go programmer Jason Falcus). Blaby has plans to release four new titles; Boulder Crash, Digger, Trun, plus its answer to Knight Lore (!), Starman Jones and the Temple of Doom. More too from Microdeal, of course, and newcomers Microvision. Lack of software? What lack of software!

Thinking of games — the arcade addicts amongst you might be pleased to notice our newest feature making its first appearance this month — Expert's Arcade Arena. You'll be more pleased to know that it was brought about largely due to the number of letters we received, demanding it!

So if there's a subject you want us to cover — Beginners Basic maybe, OS-9, Communications, anything — why not drop us a line? We can't promise to answer everyone, but your pleas won't fall on deaf ears.

But one way or the other — it looks like it's going to be a long, hot summer for the Dragon.

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Book

I INTEND to become the most prolific programme of the 6809 68000. This, in spite of the fact that I can't afford a 68000 machine yet. I have had my Dragon since September 6, 1982, and have completely destroyed my game playing fingers. I'll confess to not doing much programming between that time and now. I also have an Electron and a Spectrum, but find that not only does the Dragon have a very powerful Basic, but the most powerful and easiest to learn to use processor of the three. I really believe the Dragon to be the superior computer. I have tried (to my eternal shame) to grasp Z80 and 6502, but not only did I find it almost impossible, but now realise that they are totally useless for any serious work in a micro, and totally outdated (I can't stand them).

Please could you tell the title of a book which explains the 6809 to the full, which would take me from beginner, to very advanced. A book, which would do as above but with the Dragon in mind. Could you also tell me where to get a Technical Reference manual, giving details of the OS, system locations, and useful memory addresses. I would also like the same for Dragon DOS.

I hope you'll print this as I have a lot of time, but little patience, and want to become the world's greatest 6809/68000 programmer, as soon as possible.

Tony Saunders
Handsworth
Birmingham

Anyone who would like to help Tony can write to him c/o *Dragon User* — meanwhile, how about your full address Tony?!

Files

WITH REFERENCE to Mr R. N. Howells letter (*Dragon User* November 1985) I too typed in Peter Whittakers program Master Disk Files and found it to be an excellent piece of software. However, I too, experienced the problems encountered by R.N.H.

I spent a morning playing around with the program trying to find any typing errors and could not find any. I then set about debugging the software and rewrote all of the FREAD commands by preceding them with:

```
4100 IF EOF(a$)=1 THEN 4030
     ELSE FREAD A$;A1$
4105 IF EOF(A$)=1 THEN 4030
     ELSE FREAD A$;A2$
```

I also replaced Line 4120 with:

```
4120 GOTO 4100
```

Treat Line 5010 in the same way, ie

```
5010 IF EOF(NM$)=1 THEN 50
     40 ELSE FREAD NM$;A$
5015 IF EOF(NM$)=1 THEN 50
     40 ELSE FREAD NM$;B$
```

Line 5030 is replaced with:

```
5030 GOTO 5008
```

Once I had completed these alterations I began to put my collection of disks onto file. During this, another problem cropped up. On one of my disks there are a great number of files and so when I used option 2 (save directory) the program crashed with a bad subscript error, this I corrected by redimensioning the arrays in line 2.

```
2 DIM ARRAY$(60), Typ$(60)
```

A final problem then occurred when searching for a file. This time the program stopped with a TOO MANY FILES OPEN error so to correct this I altered the following line:

```
4140 CLOSE:NEXT A
```

Finally many thanks to P. Whittaker for an extremely useful program which even in its original form I found very useful indeed and to yourselves for producing an excellent magazine.

Leslie J. Chatfield
32 The Cockpit
Marden
Tonbridge
Kent TN12 9TQ

Miner

THANK you for publishing my pokes for MOON MINER in January 1986. I have since been contacted by Harry C. Taylor and noted that I missed out Line 2120.

Now I have come up with the best answer — which will run with or without the DOS.

```
165 IF PEEK(&HC000)=68 AND
    PEEK(&HC001)=75 THEN
    POKE30016,18:POKE300
    39,19:POKE30044,25:
    POKE30067,24: POKE300
    72,30:POKE30095,30:
    PAGE=1536
2120 A=1536+N+PAGE
```

Line 165 now tests to see if the DOS is plugged in and only pokes the data if it is. PAGE will then increment Line 2120 only if the DOS is plugged in, otherwise PAGE will be default to 0.

Anyone wondering why these pokes work should try altering the values a little and then running the game.

Graham Smith
3 Ashton Gate Terrace
Ashton Gate
Bristol BS3 1TA

Messy

I WRITE in the hope that you will print these words of caution in the mag. Recently my Dragon 64 went faulty. I was able to check that it wasn't the CPU or SAM, so I took it to the local computer dealer and asked if he could repair it.

After a few days I rang to enquire and was told, "sorry, nothing can do — but we can get you a new board". I declined the offer, collected the machine and took it to the Computer Care Centre at Macclesfield.

The machine was opened and, oh boy, what a mess! The CPU had been stolen and replaced with a VDG, the SAM chip had been replaced by a duff one, the VDG chip ripped out and damaged. Also, the cover of the modulator was missing, as was the cover of the port.

The fault in the first place was the PIA. Please warn readers not to fall into the trap of thinking that all repair centres are the same. There are cowboys about, and they can be expensive.

Peter Wroe
24 Greenfields Ave
Warrington
WA4 3BW

Papal Bull

RE PETER CALDWELL'S letter (*Dragon User,* March), I would like to inform him that the calendar was amended by Pope Gregory XIII in 1582, so that leap years occurred at the beginning of the century only if the year was divisible by 400 — ie 1600, 2000, 2400, etc.

However, this new calendar was not adopted by Britain until 1752, and the date following 2/9/1752 was 14/9/1752, to compensate for the discrepancy.

I hope this answers Peter's query, and wins him back his bet!

T Bottomley
32 Belle Vue Road
Sandal
Wakefield
WF1 5NF

Users

WE ARE a growing Dragon-user group with 34 members at the moment. We regularly publish a newsletter. We want to communicate with other (foreign, especially Spanish) groups and users and therefore we want you to publish our address. (We can answer in English, French, Latin or German.)

Our group was founded when most people thought the Dragon was dead, but the Dragon is still alive as our growing group shows.

Here in Germany we have no magazine with information about the Dragon, we depend totally on your (very good) magazine.

Siegfried Computer-Gruppe
Bernd Neuner
Dina-Ernstbergerstr 23
D-8524 Neunkirchen am Brand 1
West Germany

Thanks

I WOULD like to take the opportunity of thanking, through your pages, those companies who came to Wales in support of the Dragon at Cardiff Airport recently. I was a little disappointed that only six or seven companies managed to turn up, but those that did were very helpful and it was a good opportunity to actually see software and hardware being demonstrated.

The Dragon still has a large following here in Wales which, after all, was its birthplace. So all you companies out there — you support us, and we will support you.

N T Butters
11 Underhill Drive
Tonteg
Pontypridd

MICRODEAL HAVE DONE IT AGAIN!

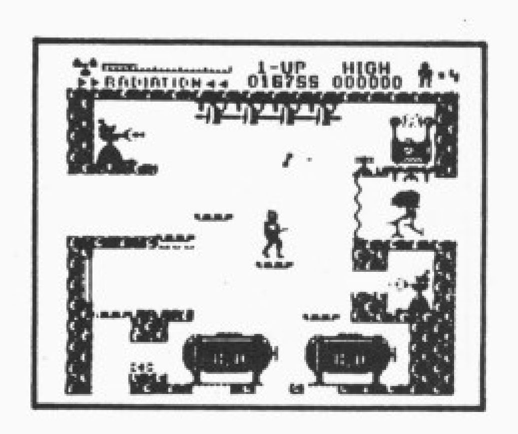
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5 Star Review

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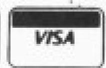
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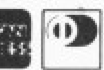
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News desk

If you have any new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

Show details

DETAILS have just been released concerning the forthcoming show, organised by John Penn Software, as reported in last month's *Dragon User.* The show is to be held in Osset Town Hall on Saturday 31st May, with the doors open from 10am to 4pm. Admission will be £1.00 for adults, 50p for children under 16 and pensioners.

"Osset is located just south of Leeds off exit 40 of the M1," explained Helen Penn. "It's very accessible and very easy to get to."

Trade supporters at the time of going to press are Blaby, Compusense, Computape, Eclipse-Fenmar, Grosvenor, John Penn and Peaksoft — although Helen was eager to stress that it was, "more than just a buying show." Other activities arranged so far include a demonstration of robotics, programming (by an anonymous Blaby programmer!) and an exhibition of work performed by the Roman Museum at St Albans using a Dragon, who use a complex graphics program to compare and classify artifacts.

John Penn are still offering to pay the expenses of anyone who would like to show off their particular pet project, so if you think yours might be suitable, give them a ring on Bordon (04203) 5970.

Cumana manual

A FIFTY page publication is now available from Cumana Limited of Guildford, which introduces the reader to the Cumana disk drive operating system for Dragon 32 and 64 personal computers.

A copy of the Dragon Disk Guide is available free on request to Cumana Limited, Pines Trading Estate, Broad Street, Guildford, Surrey.

China crisis

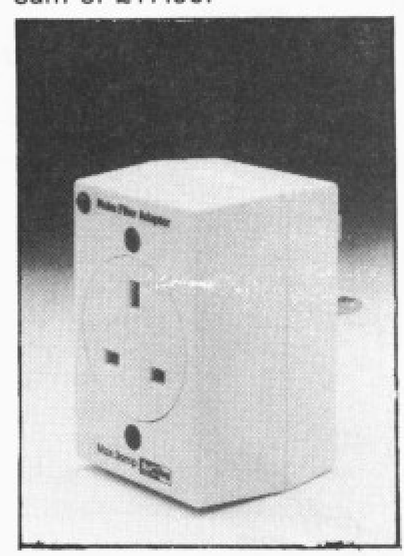
DRAGON veterans MacGowan Consultants report their most unusual request yet for their Printer Control program — a conversion to print in Hebrew! Always ready for a challenge proprietor Robert MacGowan is going to have his work cut out, as Hebrew prints out right to left, rather than the conventional left to right. Things could be worse, however, as he commented, "I'm dreading a request from China."

Those of an Oriental persuasion, and otherwise, contact MacGowan at 6 Arnhem Drive, Caythorpe, Grantham, Lincs. Tel (0400) 72085.

Plug it!

DURAPLUG Electricals Limited has introduced an inexpensive solution to the problems of mains interference with sensitive electrical equipment, such as your Dragon! The Mains Filter Adaptor fits directly into an ordinary wall socket and provides a continuous 'laundering' of the electrical supply to plugged-in appliances.

The Adaptor sells for around £18, from many electrical shops. The unit can be purchased direct from: IML, Blair House, High Street, Tonbridge, Kent. Cheques should be made payable to IML in the sum of £17.90.



Dragon User People's Chart

HERE WE are again — back at the Dragon User People's Chart — and what a month it's been. A new number one . . . with Juxtaposition way out in front . . . and a new entry with Shaolin Master from Quickbeam. Who knows what will happen next month? Only time (and you, of course) can tell.

Once again, the anagrams submitted by chart entrants had us in stitches. Honourable mentions go to David Kelsall for sentiment (Hot programs on the Dragon), Mark Taylor for topicallity (Indies hit England for six) — modesty forbids us from naming Mark Hawksbee (Dragon User is great OK). In the end, the vote went to T. Filford of Ryde, Isle of Wight for sheer audacity (Post the loot to my address!). Well done that man, and your prize should be reaching you shortly.

Remember — each month we will be asking you to vote for your top five Dragon programs of the moment — be they games, applications or utilities. Write them down in order of preference on the form opposite (or copy the form out) and send it in to us. Just to make things that little bit more interesting, we're also asking you to make up a phrase constructed from the letters of your own top three (using as many as possible) and we will pick out the one we consider to be displaying the greatest with and perspicacity. The winner each month will receive £25 worth of software, donated by Microdeal. Go for it!

Results March 1986

1 Juxtaposition .... (Wintersoft)
2 Speed Racer .... (Microdeal)
3 Shaolin Master .... (Quickbeam)
4 Eddie Steady Go .... (Incentive)
5 Shocktrooper .... (Microdeal)

Chart Four

Voting for Chart No. 4 closes at 1pm on Friday 16th May 1986. Entries received after that time will not be eligible for inclusion in that month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

My top 5: Voting Month 4

1. ....
2. ....
3. ....
4. ....
5. ....

Name ....

Address ....

....

....

....

....

My phrase is: ....

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New software for review should be sent to *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Epic Venture

Program: Total Eclipse
Supplier: Eclipse-Fenmar
Price: £9.95

BY THE time you read this review many of you will own copies of *Total Eclipse* and you will have found out whether or not it has lived up to expectations — I feel it has. It could definitely be described as the most hyped game in Dragon history. And the most waited for . . . in all senses of the word.

This game, let us have no bones about it, owes a hell of a lot of galactic units to a game which has yet to see the dawn on the Dragon, *Elite*. When *Elite* came out it was hailed as revolutionary, not because of its trading elements, but because they had been combined brilliantly with some of the most complex three-dimensional graphics ever seen on a home computer and a superb flight simulator which literally forced you to fly your way around the galaxy.

In *Elite*, battles were played out in full three-dimensional glory with many ships, all flying and fighting, on screen at the same time.

Total Eclipse has taken the trading and strategy elements of *Elite*, and enhanced them, to make a game of great skill (although, at its heart, it is still *Kingdom*!!). However, to anyone who has played *Elite* it is a very poor second; the player is left pining at the keyboard for a full 3D space flight instead of a *Cosmic Crusader* type of game in which I have never had to tackle more than a daunting one Pirate at a time.

It is unfair to compare it to *Elite*, however, and not a reviewers job to say "That game's good, but there's a game which those of you with more than one computer can play called . . . etc . . . etc". On its own, the game stands up to the test; is very addictive, very challenging, and very good.

You, the player, are placed in charge of a small trading vessel, under-equipped to handle the rigours of interstellar trading but upgrades, obviously, are available for prices which start at the obscene and go up from there! Your job is to raise as much cash as possible and become the top interstellar trader in the universe.

To this end, you spend much of your time wandering around the galaxy buying things cheaper than the average rate, and selling them for more. Trouble is, space travel costs money both in fuel and in ship maintenance, so if your journeys aren't profitable because you haven't picked the right planets to trade between, your fuel outlay comes to more than your profits, you lose money, and, take it from me pal, it's a dog's life when that starts happening. Everything spirals downhill until you end up out of fuel floating around some galaxy or other somewhere.

The trading is easy to get to grips with, but not so easy to master. The simplicity is obvious but serves to disguise, or make oblique the subtlety with which trade must be carried out.

I have yet to succeed in making a regular profit and my games consist mainly of flying around looking for dumped narcotics to buy, or famine-stricken planets to sell food to.

The trading is, of course, only one element of the game. Also, in the galaxy are wrecked star-ships, the once proud but now vacuum riddled remains of other such traders' careers. The aim upon finding one of these is simple; board it, get the log book, get out before the ship self destructs and take the log book to a space station to claim your reward.

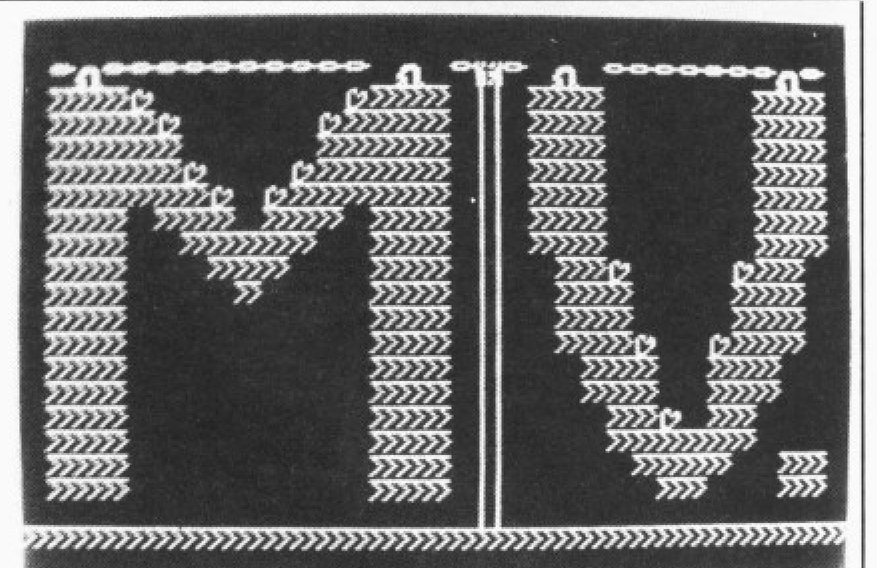
There are asteroids to be mined (but there was no way I even came close to finding even a fraction of the amount necessary to buy the mining equipment!) for oil to be sold to the space stations, as well as pirates, customs officers, galactic wars and all the other things you'd expect.

The game is simple to control, with joystick or keyboard options, easy to read (as all the text has been re-defined and whacked up on the PMODE 4 screen) and great to play.

There was a small bug in the review copy, but if they can get it out, this could be the game of the year!!

Jason Orbaum





Groovy

Program: Beanstalker
Supplier: Micro Vision
Price: £7.95

THIS game was written by the man who wrote *Jet Set Willy*, and *Manic Miner*. He is a brilliant programmer. This is a short review. In fact, this is a very short review.

Beanstalker is a *Manic Miner* type game with 60 screens, and intriguing dig instead of fill, an access code to please all hackers, and the smallest but, once accustomed to them, cutest set of graphics ever seen.

The game is wonderful, fabulous, plays well, looks fine, sounds groovy, packaged nicely, very addictive; a combination of skill and logic to test even the most intelligent player.

This was a very short review. With a game this good you can either rant about it for pages or simply say how good it is and stop talking. I'll stop talking now. Except to say buy it!!!

Jason Orbaum



Fixer

Program: Disk-Kit (Dragondos Disc Only).
Price: £10 + 50p P&P
Supplier: Pamcomms Ltd, 21 Wycombe Lane, Wooburn Green, High Wycombe, Bucks HP10 0HD.

THIS package is actually in two parts, *Disk-Fix*, and *Disk-Aid*. The first, *Disk-Fix*, is concerned with recovering damaged disks and includes an extensive sector editing facility. An option I found particularly useful was to search for the next Basic program header on disk and move to the particular track and sector. Space can also be reserved, via the Create command, for recreating files.

The *Disk-Aid* program is likely to be of more use in day to day use. This allows extended versions of many Dragondos commands, like RENAME and COPY. Full wildcards are supported using a '?' to replace any character, and '★' to replace any number of characters. This is the same syntax as used by most disc systems, in particular CP/M.

The manual goes into great detail on the disc format used by Dragondos, and is obviously written from extensive experience. Advice is given on how to recover from most types of disk and file errors. The layout of program headers on disks and directory entries are also explained in detail, covering several sides of the manual.

Having said this, it is still down to the actual user to recover any damaged files — the system is not as automatic as some other dedicated disk doctor programs. However, what you do get is a sophisticated disk editor, and some very useful disk utilities.

The software performed faultlessly through the review and is a good example of well written Basic blended with a little machine code where necessary.

Brian Cadge



Expert's Arcade Arena

Write to 'The Expert' at Dragon User 12-13 Little Newport St, London WC2H 7PP, with all your arcade tips and hints.

HELLO, and welcome to a slightly off-beat answer to Mike Gerrard's Adventure Trail. First of all who am I? Why I am writing under the name of The Expert? Why an arcade column? Why are there so many harmful additives in our foods? Important questions one and all, are they not?

Firstly, I am the undebated (due to the fact that I am not going to throw it open to debate) champion of Dragon arcade games in Britain.

Yes, I am the Person who has got past that annoying line in *Copta Snatch* that goes up and down!!! I am the Person who can do every screen on *Manic Miner* (and knows where they all are on *Jet Set Willy*)! I can get into the thousands on *Boris The Bold* with power surges! I can even understand the instructions to *Laser Zone!*

The reason for this column's existence? Well, the Dragon User office was swamped with letters demanding an arcade column and we give what the public wants ... with a little help from you. What I need from you are the maps of the games you've played (a full Jet-Set Willy map would be nice).

Pokes for the lives and the speed, and whatever else you know on any arcade game (which, for the sake of definition, is any game that doesn't require complex thought before any move, or three years to play a single game). Also, any tips you have.

Thanks go out to Robin Hemmings for starting the ball rolling with a selection of hints. Says Robin:

"I hope that some Dragon User readers will be interested in the following cheat routines:

1) POKE &H2146,&H12 before EXECuting the keyboard version of *"The Bells"* will give infinite lives.

2) Changing Line 50 of the original *Champions* to read: 50 CA=1000000: CZ=0: DI=1 will cause a starting money of £1 million, and an initial first division place.

3) Change Line 203 in Minedout to read: A=8: FOR I=1 to A-1. Thereafter, reching screen three or higher will give a choice of any starting screen."

Many thanks for those Robin, and I look forward to reading many others from other hackers in future months.

Every month I will present a short list of Games with a set of four marks after them, the marks are for Graphics, Playability, Addictiveness, and Value for Money respectively and are out of ten. You will find this month's list at the end of this column.

As this may end up to be the most outspoken part of the magazine I obviously welcome your letters with your opinions on games, and any questions you have about them. Be as frank as you like; if you disagree with my opinions about something then say so, you have as much right as me to speak out — well, almost!

Also, companies, if you feel that you want your game included in the lists, and you want it talked about here on what is sure to become a very controversial forum, send it to me ... I can't say your game is great if I haven't seen it.

And any of you home programmers, why not send me your masterpieces, you know, the ones you were "Going to send to Microdeal," but chickened out. Software houses read this magazine too and they're always on the lookout for good out. Software houses read this magazine too and they're always on the lookout for good games. Who knows? A few words from me and they could be contacting you!

Write to: Experts Arcade Arena, Dragon User, 12-13 Litle Newport Street, London WC2H 7PP.

	G	P	A	V
Draconian (Microdeal)	8	6	8	8
Copta Snatch (Blaby)	6	9	9	10
Kung Fu — The Master (Blaby)	9	10	8	9
Shocktrooper (Microdeal)	10	8	7	9
Eddie, Steady Go! (Incentive)	6	10	9	8

Operation Code

Your first helping code — explained step-by-step by ***Orbaum and Campbell.***

AFTER last month's gentle introduction to the art of assembler programming, we are going to get down to some serious brain damage this issue, with a small program (as promised last month), and a look through the simpler mnemonics (the lines of code that you and I can understand, rather than the numbers that are fed to the processor).

First, for those who prefer a slightly more coherent approach to the subject, a somewhat small bibliography. We have only come across one book truly excellent for the 6809, and that is "Programming The 6809" by Rodney Zaks and William Labiak, published by Sybek (ISBN No. 0-89588-078-4). For the more advanced assembler programmer (what are you reading this for?) the Motorola specification sheet is probably worth a look, although we have never been able to get a copy.

The program listed this month is the clear screen routine mentioned in last month's article. The format of the listing, working from left to right, is:

Address — In hexadecimal (or hex, this is base sixteen numerology — explanation in a later article), the address of the first byte of the instruction.

Instruction Operation Code — Generally known as the OP Code, as this is less of a mouthful, also shown in hex. This is part of what is passed to the processor to be interpreted.

Operand — Data for use by the processor — varies depending on the instruction.

Line Number — From the Encoder editor, purely decorative.

Label — Akin to the line numbers in BASIC, used as a reference for jumps and subroutine calls, as well as for variable references.

Instruction Mnemonics — The (reasonably) understandable version of what is passed to the processor: for reference.

Operand — This time in terms of labels or however the programmer saw fit to express it.

At the bottom of the listing is a list of all the labels used, in alphabetical order, with their addresses in hex. Anyway, the only part of the listing we are really interested in is the right most three or four (depending on outlook and upbringing) columns, which contain the actual code as written by the programmer. This portion is the most stable between different assemblers (no, not different processors, but different Dragon assembler programs), although there may be slight differences in the assembler directives — see later.

The best place to start explaining is probably at the top of the listing. The first two lines, along with the last line, produce no actual code for the processor, and are the aforementioned assembler directives. The second line positions the code at address 20000 in memory, and there will probably be a line very similar to this at the

```
0400              10   POINTR  EQU    $400
4E20              20           ORG    20000
4E20   C6 1F      30           LDB    #31
4E22   86 80      40           LDA    #128
4E24   8E 0400    50   LOOP1   LDX    #POINTR
4E27   30 85      60           LEAX   B,X
4E29   A7 84      70   LOOP2   STA    ,X
4E2B   30 8820    80           LEAX   32,X
4E2E   8C 0600    90           CMPX   #$600
4E31   25 F6      100          BLO    LOOP2
4E33 108E 0190    110          LDY    #400
4E37   31 3F      120  PAUSE   LEAY   -1,Y
4E39   26 FC      130          BNE    PAUSE
4E3B   5A         140          DECB
4E3C   2C E6      150          BGE    LOOP1
4E3E   5F         160          CLRB
4E3F   86 60      170          LDA    #96
4E41   8E 0400    180  LOOP3   LDX    #POINTR
4E44   30 85      190          LEAX   B,X
4E46   A7 84      200  LOOP4   STA    ,X
4E48   30 8820    210          LEAX   32,X
4E4B   8C 0600    220          CMPX   #$600
4E4E   25 F6      230          BLO    LOOP4
4E50 108E 0190    240          LDY    #400
4E54   31 3F      250  DELAY   LEAY   -1,Y
4E56   26 FC      260          BNE    DELAY
4E58   5C         270          INCB
4E59   C1 20      280          CMPB   #32
4E5B   25 E4      290          BLO    LOOP3
4E5D   39         300          RTS
4E5E              310          END    20000

DELAY  =4E54     LOOP1  =4E24     LOOP2 =4E29
LOOP3  =4E41     LOOP4  =4E46
PAUSE  =4E37     POINTR=0400
```

start of every program. The first line is an *equate,* and simply means that all references to the word POINTR (see lines 50 and 180) within the program are replaced by the number $400, or 1024, the start of the text screen in memory. This serves to make the program easier to read and modify. The last line marks the end of the program, and makes the execution address 20000. In this case, the execution address is the same as the start address, but this does not always have to be the case.

Op-code

And so on to the main code. As we have already described the registers we'll assume a degree of familiarity with them, but will try to drive in an understanding of the words Operand and Op-code.

Line 30 brings us upon, at last, our first Op-code, it is LDB which stands for LOAD REGISTER B (LoaD B, difficult isn't it?) and then the Operand #31. The # means "the number". If the command reads LDB 31 it would mean "Load the B-register with the contents of location 31". The # tells the assembler that it actually means "Load the B-register with the *number* 31". This is very important. The reason that we are loading B with 31 is that we do not need a memory address to be "Offset" (the label used on the flowchart) as we have register B spare. (The chances of being able to do this in a big program are about as great as the chances of Sinclair delivering punctually).

Line 40 is quite an easy one to work out: it means "LoaD register A with the number (#) 128", op-code is LDA (LoaD A), operand is #128 (the number 128). 128 is the screen code for a black square. If we store this number at memory locations that correspond to screen positions (the screen begins at $400 (1024, the contents of POINTR as defined by the earlier EQU command) and ends at $5FF (1535), a black square will appear there.

Line 50 introduces us to our first label — LOOP1, pretty simple this, it marks the first place we will loop back to — and they told you machine code was hard? The Operand LoaDs X with $400, which is what the number POINTR is equal to. If the command was LDX, POINTR (ie, without the #) X would be loaded with the contents of memory location $400. Following?

Line 60: LEAX B,X — this is not so easy to explain so we will gloss over it until we cover the uses of the X and Y registers in a later article. It basically (ie, in this program) adds the contents of register B to the contents of register X. The reason for this vagueness is that LEAK is a complex command with many different uses (Op-code: LEAX Operand: B,X).

Line 70, the second loop (thus labelled LOOP2) introduces us to another command STA, which quite logically stands for "STore the contents of register A". Thus STA ,X means "STore the contents of register A in the memory location pointed to by X." Therefore, on the first run the number 128 (contents of A) will be stored at location $400 + 31 (the contents of X). which is the end of the top line on the screen. This is the action line.

Line 80 adds 32 to the X coordinate using the LEAX command exactly as earlier, only with a number instead of a register. Note that there is no need for a # in this case. This command can be signed, ie, to take 32 from X we need only write LEAX-32,X.

Line 90 introduces CMPX. As you might guess this means "CoMPare X with"; in this case X is being compared with the address of the bottom of the screen for obvious reasons (if you have understood the flowchart). (Op-code: CMPX Operand: #$600). NB, CMPX $600 would compare X with the contents of memory location $600 as described earlier.

Line 100 introduces a BRANCH command. The branch commands will be covered in an article dedicated to their use next month, for now, this command means "Branch if LOwer than operand of last compare instruction" thus, if X is lower than $600 the routing loops.

Line 110: LoaD register Y with 400.

Line 120: Called pause as this is a loop designed to slow the program down, so that the effect is noticeable. This is achieved by decrementing the Y register, previously loaded with 400, and using another branch (Line 130), BNE, to go back and do it again if the result is non-zero.

Line 140: DECrement B, subtracts one from the contents of the B register.

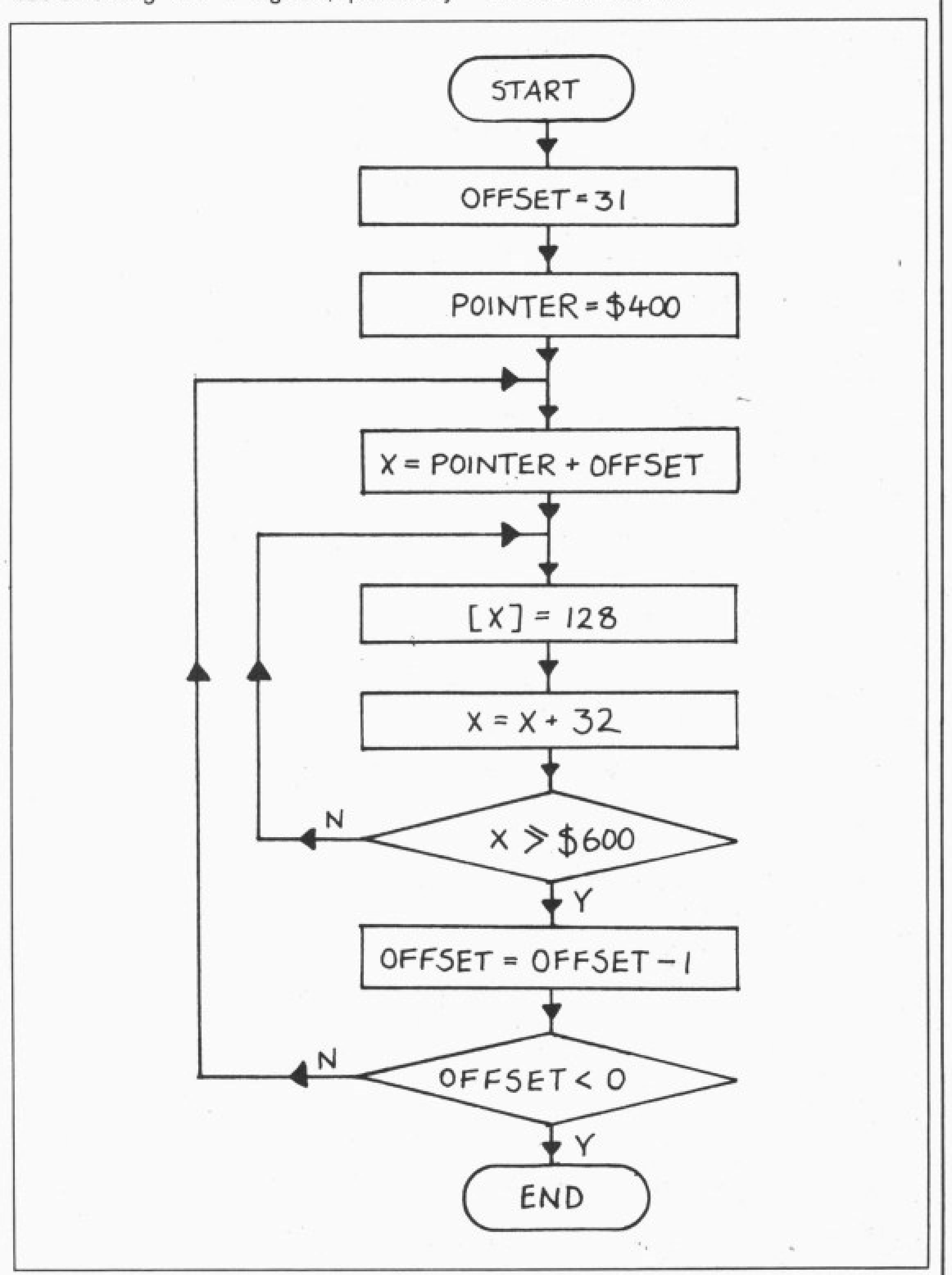
Line 150: "Branch if Greater than or Equal to", back to the setting up of the X register. This instruction controls the movement across the screen.

Line 160: CLeaR B register. Equivalent to LDB #0. This is to set the offset for the traverse back across the screen, which is performed by the code in lines 170/290, in much the same way as the previous part.

Line 300: ReTurn from Subroutine. Returns control the routine that called the code.

Well, that about rounds it up for this month: no glossary, although in a few months we will present an entire list of 6809 mnemonics and their meanings over two articles in various tables for reference.

Next month we will present a complete explanation of all the assembler directives, a full coverage of addressing modes, and base numerology and a tutorial on the Branch instructions.



Knight Games

A cunning brainteaser — brought to you by ***Pat McCabe*** *and* ***Colin Turner***

NO ARCADE action this month — just a frustratingly difficult mind challenge, which is simple to play, but hard to complete. The idea is to move the chequered cursor around a standard 8×8 chess board, using the cursor keys, moving as the knight does in chess.

Starting with blue and white squares, you must change them to orange and cyan by landing on them . . . but without attempting to change the same square twice. The computer checks for invalid moves and stops play if there's nowhere to go — so there's no chance of cheating!

Written in entirely position independant machine code, the main playing screen is in semi-graphics and includes brief on-screen instructions and move counter. There are two levels of play — Level One starts in the same place every time, Level Two starts on a random square.

To load the program, run the hex loader in Listing One and use it to enter the code given in Listing Two. When finished, save the code to tape with *CSAVEM "Nitemove" 8500,10578,8500.* To load it back in, use *CLOADM,* and when the OK message comes up, enter *EXEC 8500.*

Naturally, if you want ot type in code in smaller amounts, run the hex loader and enter the finish address you want to stop at — you then save to tape with *CSAVEM"NITEMOVE" 8500 n, 8500,* where "n" is your finish address. Next time, you'd load in the code, but use "n" as your start address.

However, if all that typing seems too daunting, an enhanced version (with a higher loading screen which auto-execs) is available for the sum of £2.50 from P McCabe, 29 Spire View Road, Louth, Lincs LN11 8SL.

Looking at the assembler listing (for those with assemblers) you might guess that we are newcomers to machine code. The program structure might not be all that it could be, but this is our first attempt — so anyone stuck with m/c, do as we did — stick with it and you'll get there!

```
10 ' ENTER EACH LINE OF HEX
20 ' DIGITS, PRESS ENTER THEN
30 ' ENTER THE CHECKSUM
40 CLS
50 INPUT"ENTER START ADDRESS";SA
60 INPUT"ENTER FINISH ADDRESS";FA
80 FOR X=SA TO FA STEP 10
90 PRINTHEX$(X);":";
100 CH=0:INPUT V$:A=0
110 FOR L=1 TO LEN(V$) STEP 2
120 V=VAL("&H"+MID$(V$,L,2))
130 CH=CH+V:POKE(X+A),V
140 A=A+1:NEXT
150 PRINT" = ";
160 INPUT CH$
170 IF CH$<>HEX$(CH) THEN 200 ELSE 180
180 NEXT
190 END
200 SOUND150,5:PRINT"ERROR - ENTER LINE
    AGAIN: GOTO 100
```

```
2134 1705108E06008680A780 = 2ED
213E 8C1E0025F9860DB7FF22 = 433
2148 B7FFC0B7FFC3B7FFC5B7 = 821
2152 FFC78E06008680A7808C = 513
215C 1E0026F98E06719F885F = 3C8
2166 318C2BA6A084BFA780A7 = 53F
2170 881FA7883FA7885FA788 = 4D2
217A 7FA789009FA78900BF8C = 4C9
2184 187D27675CC10D26DC5F = 3AE
218E 308902F326D5434F4E54 = 3DD
2198 524F4C533A2D20202043 = 24A
21A2 5552534F52204B455953 = 2F7
21AC 2020464F52204D4F5645 = 27E
21B6 4D454E542E5052455353 = 2EF
21C0 20454E5445522020544F = 281
21CA 204348414E47452E2020 = 234
21D4 20225222205245535441 = 255
21DE 52545320225122205155 = 274
21E8 495453202020208E1864 = 27A
21F2 9F885F318C27A6A084BF = 4F3
21FC A780A7881FA7883FA788 = 512
2206 5FA7887FA789009FA789 = 50C
2210 00BF5CC10826E1CC3030 = 417
221A FD1F0020084D4F564553 = 2CE
2224 2030308E0660CC000010 = 250
222E 8ECFCFCEAFAF10AF81EF = 687
2238 814C810426F63088104F = 385
2242 5CC11026ED1E235F8C16 = 382
224C 6026E5B61F8081322705 = 39F
2256 8E0E642623BD978EF601 = 422
2260 16C40758CB603404BD97 = 3F0
226A 8EB601168407488B0635 = 2F4
2274 041F0110AE84108CAFAF = 360
227E 102701A3102601C3FE1F = 2F2
2288 3033C9F9FE8D2533448D = 4D9
2292 2133C901FA8D1B33488D = 3C8
229C 1733C903F88D1133488D = 3B4
22A6 0D33C901FA8D0733448D = 39C
22B0 031702E4ECC481AF1027 = 417
22BA 024581CF102702483580 = 2CD
22C4 BD800627FB8151102706 = 374
22CE 818152102 7FE5F815E26 = 3ED
22D8 15EC89FDE0818027E317 = 589
22E2 01AF3089FC00EC841026 = 40B
22EC 01F1810A260FEC882081 = 3C7
22F6 8027CB170197EC841701 = 3A9
2300 DE81082613EC88DF8180 = 4F4
230A 27B81701843089FDFEEC = 51B
2314 841701C781092613EC88 = 39A
231E E2818027A117016D3089 = 3E9
2328 FE02EC841701B0810D26 = 3EC
2332 91FE1F2033C9FBFEFF1F = 5E1
233C 20BC1F20102700C73344 = 290
2346 FF1F20BC1F20102700BB = 32B
```

```
2350 33C901FAFF1F20BC1F20 = 430
235A 102700AD3348FF1F20BC = 359
2364 1F20102700A133C903F8 = 30E
236E FF1F20BC1F2010270093 = 303
2378 3348FF1F20BC1F201027 = 2EB
2382 008733C901FAFF1F20BC = 478
238C 1F20102700793344FF1F = 284
2396 20BC1F201027006D33C9 = 2BB
23A0 FBFEFF1F20BF1F608E1B = 51E
23AA 669F885F318D00CEA6A0 = 4BE
23B4 84BFA780A7881FA7883F = 526
23BE A7885FA7887FA789009F = 50B
23C8 A78900BF5CC11326E110 = 436
23D2 8EFFFF313F26FCBE1F60 = 55B
23DC 1700B486FF8E00C81701 = 3BE
23E6 76867D8E006417016E8E = 37F
23F0 1B668680A7808C1E0026 = 37E
23FA F9BE1F30BF1F203089FE = 4BB
2404 00EC84102600D43089FE = 431
240E 00EC841083AAAA270E10 = 39C
2418 83CACA272C3089020010 = 335
2422 26FF80108EFFFF1700A5 = 4FD
242C 17010A341086BB8E0055 = 28A
2436 1701243510BF1F20BF1F = 25D
2440 303089FE001026FE3D10 = 368
244A 8EDFDF1700811700E634 = 415
2454 1086BB8E005517010035 = 281
245E 10BF1F20BF1F303089FE = 3D3
2468 001026FE19FC1F008136 = 31F
2472 1026FE4EC13410270173 = 322
247C 1026FE44594F55204341 = 319
2486 4E275420474F20544845 = 280
2490 5245213089FE00EC8481 = 460
249A DF2606108EDFDF202E81 = 436
24A4 FF2606108EFFFF202481 = 48C
24AE AA2606108EAFAF201A81 = 38D
24B8 CA2606108ECFCF201081 = 3E3
24C2 DA2606108EDFDF200681 = 409
24CC FA108EFFFF5F10AF8430 = 568
24D6 88205CC11026F5358081 = 426
24E0 AF270C81CF271181DF27 = 3F1
24EA 1681FF271B108EAAAACE = 498
24F4 A5A5201B108ECACACEC5 = 54A
24FE C52012108EDADACED5D5 = 5C1
2508 2009108EFAFACEF5F520 = 593
2512 004F5F10AF843088205C = 325
251C C10426F54C8104260F34 = 31A
2526 10861F8E004517002E35 = 202
2530 1016FF391E325F20DC34 = 33D
253A 168E184AFC1F00C13927 = 342
2544 105CED843088208C1938 = 392
254E 25F6FD1F0035964CC62F = 443
2558 FD1F0020E13402B6FF01 = 409
2562 84F7B7FF01B6FF0384F7 = 665
256C B7FF03B6FF238A08B7FF = 5D9
2576 231A5035023410C6FCF7 = 3C1
2580 FF20301F26FCAEE47FFF = 5A0
258A 20301F26FCAEE44A26EB = 47E
2594 1CAF359086838E006617 = 3A4
259E FFBD86C88E00E117FFB5 = 644
25A8 8E1B669F885F318C2BA6 = 423
25B2 A084BFA780A7881FA788 = 587
25BC 3FA7885FA7887FA78900 = 4AB
25C6 9FA78900BF5CC11325E1 = 4C4
25D0 BE1F203089FE00EC8416 = 43A
25DA FF03534F525259204E4F = 35E
25E4 204D4F564553204C4546 = 2A1
25EE 548E1B609F885F318C30 = 3D0
25F8 A6A084BFA780A7881FA7 = 5A5
2602 883FA7885FA7887FA789 = 533
260C 009FA78900BF5CC11F25 = 3EF
2616 E1BD800681591027FB14 = 444
2620 814E1027032A26EF5745 = 2E4
262A 4C4C20444F4E4520414E = 28D
2634 4F544845522047414D45 = 2BC
263E 202859204F52204E29BD = 2B6
2648 BA778E04A29F88308D01 = 44A
2652 BEBD90E5BD90E58E0400 = 5B4
265C A6848840A7808C05FF23 = 4CC
2666 F58E040086AFA7808C04 = 473
2670 1E23F98E05A2869CA780 = 4B8
267A 8C05BD23F98698B705BE = 502
2684 8E041F86CFA784308820 = 409
268E 8C05DF23F68692B7043E = 49A
2698 8E045E869AA784308820 = 413
26A2 8C059E23F68E05E186DF = 521
26AC A7808C060023F98691B7 = 4A3
26B6 04218E04228693A7808C = 3A5
26C0 043D23F98E042086FFA7 = 43B
26CA 843088208C05E023F686 = 46C
26D4 94B705A18E04418695A7 = 486
26DE 843088208C058123F6BD = 444
26E8 80068131102700D38132 = 2F5
26F2 102700CD812010270102 = 1DF
26FC 86013402C60234048E04 = 24F
2706 00108E0401861FE6A0E7 = 3B5
2710 804A26F935045A26E98E = 419
271A 041F108E043F8615E6A4 = 329
2724 E78431A8203088204A26 = 3AC
272E F3C6028E0600108E05FF = 3F1
2738 861F3404E6A2E7824A26 = 43E
2742 F935045A26E98E05E010 = 41E
274C 8E05C0860FE6A4E78431 = 50E
2756 A8E03088E04A26F33502 = 4BA
```

```
2760 4A269B861C8E05C1108E = 39F
276A 05C2EE84E6A0E7804A26 = 596
2774 F9FF05DD108E2EE0313F = 4F6
277E 26FC16FF647F1F70C620 = 48F
2788 8E04008680A784308820 = 39B
2792 8C060123F68E0400108E = 2DC
279C 0401A6A0A7808C060023 = 327
27A6 F73420108E1500313F26 = 294
27B0 FC340486648E002417FD = 3E4
27BA A235045A26C816F974B7 = 45D
27C4 1F70B71F808E05C19F88 = 460
27CE 308C0EBD90E586C88E00 = 4D8
27D8 1917FD8116FF08202020 = 32B
27E2 20202020505245535320 = 22D
27EC 53504143454241522054 = 2B5
27F6 4F20535441525400B61F = 2D2
2800 7081311027FF7C813210 = 397
280A 27FF761026FED6202043 = 429
2814 48414E47452054484520 = 284
281E 424F4152442046524F4D = 2BC
2828 20424C55452020202020 = 1E8
2832 20262057484954452054 = 25B
283C 4F204F52414E47452041 = 28C
2846 4E442043594148202020 = 23D
2850 20202020202020202020 = 140
285A 20202020202020202020 = 140
2864 20202020202020202020 = 140
286E 2020202020205553494E = 1FF
2878 47205448452043555253 = 2A5
2882 4F52204B455953204D4F = 2B9
288C 56452020202020204153 = 1EF
2896 20544845204B4E494748 = 292
28A0 542043414E20494E2043 = 260
28AA 48455353202020202020 = 1F3
28B4 20202020202020202020 = 140
28BE 20202020202020202020 = 140
28C8 20202020202020202020 = 140
28D2 20202020202020202020 = 140
28DC 20202020202020202020 = 140
28E6 20202020202020202020 = 140
28F0 20202020202020202020 = 140
28FA 20202020202020202020 = 140
2904 20202020202020202020 = 140
290E 20202020202020202020 = 140
2918 20202020202020202020 = 140
2922 20202020202020202020 = 140
292C 20202020202020202045 = 165
2936 4E5445522053484C4C4C = 2D8
2940 204C4556454C2031204F = 258
294A 522032203F00BDB3B400 = 327
```

```
************************************
**********  NITEMOVE  **************
**************  BY  ****************
****  P.McCABE & C.TURNER.  ********
************************************

BEGIN   LBGR    INSTR
************************************
**** SET UP SEMIGRAPHICS 24 ********
************************************
SEMI24  LDX     #$0600
        LDA     #$80
LOOP    STA     ,X+
        CMPX    #$1E00
        BCS     LOOP
        LDA     #$0D
        STA     $FF22
        STA     $FFC0
        STA     $FFC3
        STA     $FFC5
        STA     $FFC7
************************************
**** ON SCREEN INSTRUCTIONS ********
************************************
CONTRL  LDX     #$0600
        LDA     #$80
LOOP1   STA     ,X+
        CMPX    #$1E00
        BNE     LOOP1
        LDX     #$0671
        STX     $88
        CLRB
        LEAY    PRINT,PCR
LOOP2   LDA     ,Y+
        ANDA    #$BF
        STA     ,X+
        STA     $1F,X
        STA     $3F,X
        STA     $5F,X
        STA     $7F,X
        STA     $9F,X
        STA     $BF,X
        CMPX    $8269
        BEQ     SCORE
        INCB
        CMPB    #13
        BNE     LOOP2
LINE    CLRB
        LEAX    755,X
        BNE     LOOP2
PRINT   FCB     /CONTROLS:-    /
        FCB     /CURSOR KEYS   /
        FCB     /FOR MOVEMENT./
        FCB     /PRESS ENTER   /
        FCB     /TO CHANGE.    /
        FCB     /"R" RESTARTS /
        FCB     /"Q" QUITS     /
************************************
****  SCORE INITIALIZATION  ********
************************************
SCORE   LDX     $8244
        STX     $88
        CLRB
        LEAY    SCORE1,PCR
LOOP3   LDA     ,Y+
        ANDA    #$BF
        STA     ,X+
        STA     $1F,X
        STA     $3F,X
        STA     $5F,X
        STA     $7F,X
        STA     $9F,X
        STA     $BF,X
        INCB
        CMPB    #8
        BNE     LOOP3
        LDD     #'00
        STD     $1F00
        BRA     BOARD
SCORE1  FCB     /MOVES 00/
************************************
********* SET UP DISPLAY ***********
************************************
BOARD   LDX     #$0660
        LDD     #$0000
        LDY     #$CFCF
        LDU     #$AFAF
ROWS    STY     ,X++
        STU     ,X++
        INCA
        CMPA    #4
        BNE     ROWS
        LEAX    16,X
        CLRA
        INCB
        CMPB    #16
        BNE     ROWS
        EXG     Y,U
        CLRB
        CMPX    #$1660
        BNE     ROWS
************************************
*** RANDOMIZE START POSITION *******
************************************
        LDA     $1F00
        CMPA    #50
        BEQ     START2
        LDX     #$0E64
        BNE     START1
START2  JSR     $978E
        LDB     278
        ANDB    #$07
        ASLB
        ADDB    #$60
        PSHS    B
        JSR     $978E
        LDA     278
        ANDA    #$07
        ASLA
        ADDA    #$06
        PULS    B
        TFR     D,X
        LDY     ,X
        CMPY    #$AFAF
START1  LBEQ    FSTCHK
        LBNE    NXTCHK
************************************
***** MAIN CONTROL ROUTINE *********
************************************
WAIT    LDU     $1F30
        LEAU    -1538,U
        BSR     CHECK
        LEAU    4,U
        BSR     CHECK
        LEAU    506,U
        BSR     CHECK
        LEAU    8,U
        BSR     CHECK
        LEAU    1016,U
        BSR     CHECK
        LEAU    8,U
        BSR     CHECK
        LEAU    506,U
        BSR     CHECK
        LEAU    4,U
        BSR     CHECK
        LBSR    NOMOVE
CHECK   LDD     ,U
        CMPA    #$AF
        LBEQ    CYAN
        CMPA    #$CF
        LBEQ    ORANGE
        PULS    PC
KEYS    JSR     $8006
        BEQ     KEYS
        CMPA    #81
        LBEQ    QUIT
        CMPA    #82
        LBEQ    BEGIN
        CMPA    #$5E
        BNE     DOWN
        LDD     -544,X
        CMPA    #$80
```

```
        BEQ   KEYS
        LBSR  CHEK
        LEAX  -1024,X
        LDD   ,X
        LBNE  CHEK2
DOWN    CMPA  ##0A
        BNE   LEFT
        LDD   32,X
        CMPA  ##80
        BEQ   KEYS
        LBSR  CHEK
        LDD   ,X
        LBSR  CHEK2
LEFT    CMPA  ##08
        BNE   RIGHT
        LDD   -33,X
        CMPA  ##80
        BEQ   KEYS
        LBSR  CHEK
        LEAX  -514,X
        LDD   ,X
        LBSR  CHEK2
RIGHT   CMPA  ##09
        BNE   ENTER
        LDD   -30,X
        CMPA  ##80
        BEQ   KEYS
        LBSR  CHEK
        LEAX  -510,X
        LDD   ,X
        LBSR  CHEK2
ENTER   CMPA  ##0D
        BNE   KEYS
        LDU   #1F20
        LEAU  -1026,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  4,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  506,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  8,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  1016,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  8,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  506,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  4,U
        STU   #1F20
        CMPX  #1F20
        LBEQ  CANGO
        LEAU  -1026,U
        STU   #1F20
NOGO    STX   #1F60
        LDX   ##1E66
        STX   #88
        CLRB
        LEAY  CANT,PCR
LOOP4   LDA   ,Y+
        ANDA  ##BF
        STA   ,X+
        STA   #1F,X
        STA   #3F,X
        STA   #5F,X
        STA   #7F,X
        STA   #9F,X
        STA   #BF,X
        INCB
        CMPB  #19
        BNE   LOOP4
        LDY   ##FFFF
DELAY   LEAY  -1,Y
        BNE   DELAY
        LDX   #1F60
        LBSR  CHEK
        LDA   #255
        LDX   #200
        LBSR  SOUND
        LDA   #125
        LDX   #100
        LBSR  SOUND
        LDX   ##1E66
        LDA   ##80
LOOP5   STA   ,X+
        CMPX  ##1E00
        BNE   LOOP5
        LDX   #1F30
        STX   #1F20
        LEAX  -512,X
        LDD   ,X
        LBNE  CHEK2
CANGO   LEAX  -512,X
        LDD   ,X
        CMPD  ##AAAA
        BEQ   FSTCHK
        CMPD  ##CACA
        BEQ   NXTCHK
        LEAX  512,X
        LBNE  NOGO
FSTCHK  LDY   ##FFFF
        LBSR  MOVE
        LBSR  UNITS
        PSHS  X
        LDA   #187
        LDX   #85
        LBSR  SOUND
        PULS  X
        STX   #1F20
        STX   #1F30
        LEAX  -512,X
        LBNE  WAIT
NXTCHK  LDY   ##DFDF
        LBSR  MOVE
        LBSR  UNITS
        PSHS  X
        LDA   #187
        LDX   #85
        LBSR  SOUND
        PULS  X
        STX   #1F20
        STX   #1F30
        LEAX  -512,X
        LBNE  WAIT
SCRCHK  LDD   #1F00
        CMPA  #54
        LBNE  KEYS
        CMPB  #52
        LBEQ  ENDING
        LBNE  KEYS
CANT    FCB   /YOU CAN'T GO THER/
        FCB   /E!/
**********************************
***  COLOUR CHANGES ROUTINE  ***
**********************************
CHEK    LEAX  -512,X
        LDD   ,X
        CMPA  ##DF
        BNE   FF
        LDY   ##DFDF
        BRA   MOVE
FF      CMPA  ##FF
        BNE   AA
        LDY   ##FFFF
        BRA   MOVE
AA      CMPA  ##AA
        BNE   CA
        LDY   ##AFAF
        BRA   MOVE
CA      CMPA  ##CA
        BNE   DA
        LDY   ##CFCF
        BRA   MOVE
DA      CMPA  ##DA
        BNE   FA
        LDY   ##DFDF
        BRA   MOVE
FA      CMPA  ##FA
        LDY   ##FFFF
MOVE    CLRB
LOOP6   STY   ,X
        LEAX  32,X
        INCB
        CMPB  #16
        BNE   LOOP6
        PULS  PC
**********************************
***  CURSOR COLOUR CONTROLS  ***
**********************************
CHEK2   CMPA  ##AF
        BEQ   BLUE
        CMPA  ##CF
        BEQ   BUFF
        CMPA  ##DF
        BEQ   CYAN
        CMPA  ##FF
        BEQ   ORANGE
BLUE    LDY   ##AAAA
        LDU   ##A5A5
        BRA   MOVE2
BUFF    LDY   ##CACA
        LDU   ##C5C5
        BRA   MOVE2
CYAN    LDY   ##DADA
        LDU   ##D5D5
        BRA   MOVE2
ORANGE  LDY   ##FAFA
        LDU   ##F5F5
        BRA   MOVE2
MOVE2   CLRA
        CLRB
LOOP7   STY   ,X
        LEAX  32,X
        INCB
        CMPB  #4
        BNE   LOOP7
        INCA
        CMPA  #4
        BNE   SWOP
        PSHS  X
        LDA   #31
        LDX   #69
        LBSR  SOUND
        PULS  X
        LBRA  SCRCHK
SWOP    EXG   U,Y
        CLRB
        BRA   LOOP7
**********************************
******  COUNTING ROUTINE  ******
**********************************
UNITS   PSHS  A,B,X
        LDX   #6218
COUNT   LDD   #1F00
        CMPB  #57
        BEQ   TENS
        INCB
LOOP8   STD   ,X
        LEAX  32,X
        CMPX  #6456
        BLO   LOOP8
        STD   #1F00
        PULS  X,A,B,PC
TENS    INCA
        LDB   #47
        STD   #1F00
        BRA   COUNT
**********************************
*******  SOUNDS ROUTINE  *******
**********************************
SOUND   PSHS  A
        LDA   #FF01
        ANDA  #247
        STA   #FF01
        LDA   #FF03
        ANDA  #247
        STA   #FF03
        LDA   #FF23
        ORA   #8
        STA   #FF23
        ORCC  ##50
        PULS  A
        PSHS  X
        LDB   #252
SD1     STB   #FF20
SD2     LEAX  -1,X
        BNE   SD2
        LDX   ,S
        CLR   #FF20
SD3     LEAX  -1,X
        BNE   SD3
        LDX   ,S
        DECA
        BNE   SD1
        ANDCC ##AF
        PULS  X,PC
**********************************
*****  NO VALID MOVE LEFT  *****
**********************************
NOMOVE  LDA   #131
        LDX   #102
        LBSR  SOUND
        LDA   #200
        LDX   #225
        LBSR  SOUND
FINISH  LDX   ##1E66
        STX   #88
        CLRB
        LEAY  TYPE,PCR
LOOP9   LDA   ,Y+
        ANDA  ##BF
        STA   ,X+
        STA   #1F,X
        STA   #3F,X
        STA   #5F,X
        STA   #7F,X
        STA   #9F,X
        STA   #BF,X
        INCB
        CMPB  #19
        BCS   LOOP9
        LDX   #1F20
        LEAX  -512,X
        LDD   ,X
        LBRA  CHEK2
TYPE    FCB   /SORRY NO MOVES/
        FCB   / LEFT/
**********************************
********  ANOTHER GAME  ********
**********************************
ENDING  LDX   ##1E60
        STX   #88
        CLRB
        LEAY  AGAIN,PCR
LOOP10  LDA   ,Y+
        ANDA  ##BF
        STA   ,X+
        STA   #1F,X
        STA   #3F,X
        STA   #5F,X
        STA   #7F,X
        STA   #9F,X
        STA   #BF,X
        INCB
        CMPB  #31
        BCS   LOOP10
LOOP11  JSR   #8006
        CMPA  ##59
        LBEQ  BEGIN
        CMPA  ##4E
        LBEQ  QUIT
        BNE   LOOP11
AGAIN   FCB   /WELL DONE ANOTHER/
        FCB   / GAME (Y OR N)/
**********************************
****  INITIAL TEXT DISPLAY  ****
**********************************
INSTR   JSR   #BA77
        LDX   ##4A2
        STX   #88
        LEAX  RULES,PCR
        JSR   #90E5
        JSR   #90E5
        LDX   ##400
LOOP12  LDA   ,X
        EORA  ##40
        STA   ,X+
        CMPX  ##5FF
        BLS   LOOP12
        LDX   ##400
        LDA   ##AF
LOOP13  STA   ,X+
        CMPX  ##41E
        BLS   LOOP13
        LDX   ##5A2
        LDA   #158
LOOP14  STA   ,X+
        CMPX  ##5BD
        BLS   LOOP14
        LDA   #152
        STA   #5BE
        LDX   ##41F
        LDA   ##CF
```

```
LOOP15 STA    ,X
       LEAX   32,X
       CMPX   #$5DF
       BLS    LOOP15
       LDA    #146
       STA    #43E
       LDX    #$45E
       LDA    #154
LOOP16 STA    ,X
       LEAX   32,X
       CMPX   #$59E
       BLS    LOOP16
       LDX    #$5E1
       LDA    #$DF
LOOP17 STA    ,X+
       CMPX   #$600
       BLS    LOOP17
       LDA    #145
       STA    #421
       LDX    #$422
       LDA    #147
LOOP18 STA    ,X+
       CMPX   #$43D
       BLS    LOOP18
       LDX    #$420
       LDA    #$FF
LOOP19 STA    ,X
       LEAX   32,X
       CMPX   #$5E0
       BLS    LOOP19
       LDA    #146
       STA    #5A1
       LDX    #$441
       LDA    #149
LOOP20 STA    ,X
       LEAX   32,X
       CMPX   #$581
       BLS    LOOP20
LOOP21 JSR    #8006
       CMPA   #49
       LBEQ   LEVEL
       CMPA   #50
       LBEQ   LEVEL
       CMPA   #32
       LBEQ   CKLEVL
       LDA    #1
LOOP22 PSHS   A
       LDB    #2
LOOP23 PSHS   B
       LDX    #$400
       LDY    #$401
       LDA    #31
LOOP24 LDB    ,Y+
       STB    ,X+
       DECA
       BNE    LOOP24
       PULS   B
       DECB
       BNE    LOOP23
       LDX    #$41F
       LDY    #$43F
       LDA    #$15
LOOP25 LDB    ,Y
       STB    ,X
       LEAY   32,Y
       LEAX   32,X
       DECA
       BNE    LOOP25
       LDB    #2
LOOP26 LDX    #$600
       LDY    #$5FF
       LDA    #31
       PSHS   B
LOOP27 LDB    ,-Y
       STB    ,-X
       DECA
       BNE    LOOP27
       PULS   B
       DECB
       BNE    LOOP26
       LDX    #$5E0
       LDY    #$5C0
       LDA    #15
LOOP28 LDB    ,Y
       STB    ,X
       LEAY   -32,Y
       LEAX   -32,X
       DECA
       BNE    LOOP28
       PULS   A
       DECA
       BNE    LOOP22
       LDA    #28
       LDX    #$5C1
       LDY    #$5C2
       LDU    ,X
LOOP28 LDB    ,Y+
       STB    ,X+
       DECA
       BNE    LOOP28
       STU    #5DD
       LDY    #12000
SLOW   LEAY   -1,Y
       BNE    SLOW
       LBRA   LOOP21
**********************************
****   SCROLLS SCREEN CLEAR   ****
**********************************
SCROLL CLR    #1F70
       LDB    #32
LOOP30 LDX    #$400
       LDA    #$80
LOOP31 STA    ,X
       LEAX   32,X
       CMPX   #$601
       BLS    LOOP31
       LDX    #$400
       LDY    #$401
LOOP32 LDA    ,Y+
       STA    ,X+
       CMPX   #$600
       BLS    LOOP32
       PSHS   Y
       LDY    #$1500
LOOP33 LEAY   -1,Y
       BNE    LOOP33
       PSHS   B
       LDA    #100
       LDX    #36
       LBSR   SOUND
       PULS   B
       DECB
       BNE    LOOP30
       LBRA   SEMI24
**********************************
*****   START LEVEL CHECKS   *****
**********************************
LEVEL  STA    #1F70
       STA    #1F80
       LDX    #$5C1
       STX    #88
       LEAX   SPCBAR,PCR
       JSR    #90E5
       LDA    #200
       LDX    #25
       LBSR   SOUND
       LBRA   LOOP21
SPCBAR FCB    /       PRESS SPAC/
       FCB    /EBAR TO START/,0
CKLEVL LDA    #1F70
       CMPA   #49
       LBEQ   SCROLL
       CMPA   #50
       LBEQ   SCROLL
       LBNE   LOOP21
**********************************
********   INSTRUCTIONS   ********
**********************************
RULES  FCB    /  CHANGE THE B/
       FCB    /OARD FROM BLUE  /
       FCB    /      & WHITE TO O/
       FCB    /RANGE AND CYAN  /
       FCB    /                /
       FCB    /                 /
       FCB    /      USING THE CU/
       FCB    /RSOR KEYS MOVE  /
       FCB    /      AS THE KNIGH/
       FCB    /T CAN IN CHESS  /
       FCB    /                /
       FCB    /                /
       FCB    /                /
       FCB    /                 /
       FCB    /                /
       FCB    /                /
       FCB    /                /
       FCB    /                /
       FCB    /      ENTER SKILL /
       FCB    /LEVEL 1 OR 2 ?/,0
**********************************
**  FINISH & RETURN TO BASIC  **
**********************************
QUIT   JSR    #$3B4
```

DRAGON OWNERS

& TANDY COLOUR

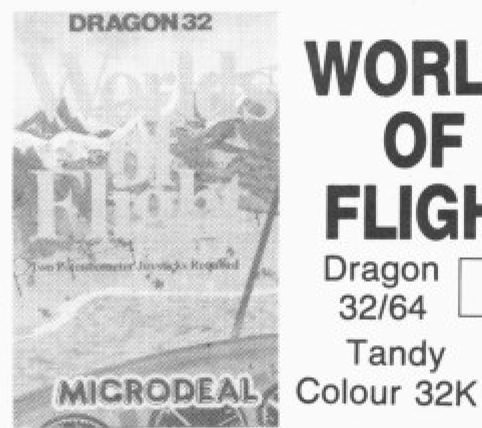
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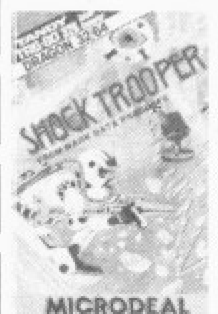
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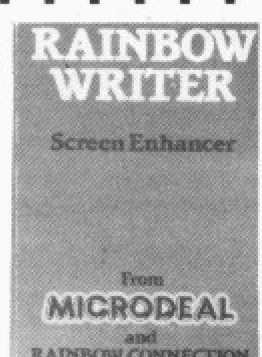
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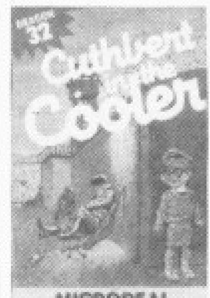
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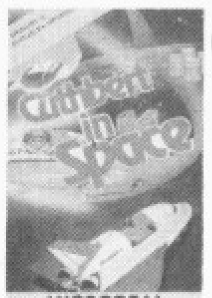
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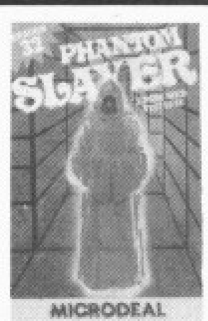
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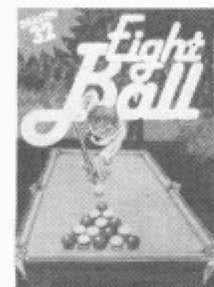
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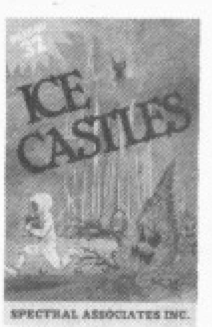
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3

4

Communication

Send in you questions, requests, and pleas to Communication, Dragon User, 12-13 Little Newport Street, London WC2

Problem Need readable hard copy (or tape) of 'Snakes Alive' published in Dragon User, December 1984.
Enquirer Richard Craig, 210 Oxford Road, Basford, Newcastle-under-Lyme, Staffs.

Problem Wanted — a shopping program to add delete numbered items, total prices, store on tape.
Enquirer R E Sharpe, 6 Easthorpe Lane, Redmile, Notts.

Problem Does any one know how to get Telewriter (DragonDos version) to print multiple copies.
Enquirer John Appleyard, 17 Carr Bridge Avenue, Leeds — also F Jones, 58 Bridgnorth Road, Compton, Wolverhampton.

Problem Have Dragon 32 and would like to connect it to an Epson MX80. Can anyone tell me if this is possible?
Enquirer Simon Richards, 31 Brendoy Road, Watchet, Somerset TA23 0AX.

Problem Have recently acquired second-hand Dragon Data Disc Drive, but there was no manual with it. Could anyone locate a copy — or supplier — of the manual?
Enquirer J D Edwards, 16 Keppel Road, North Berwick, East Lothian.

Problem My cassette lead is broken. Where can I buy a new lead and how much would it cost?
Enquirer Matthew Docherty, 53 Scotland Way, Horsforth, Leeds, W. Yorks.

Problem Need m/c routine to dump Hi-Res screen to Tandy CGP-115 4-colour printer.
Enquirer Stuart King, 41 Gatehead Road, Crosshouse, Kilmarnock.

Problem How do I divert text to cartridge port instead of Centronics port?
Enquirer R Cameron, 86 Sommerville Gardens, South Queensferry, W. Lothian.

Problem What changes need to be made to the 'Dragon Windows' assembly listing so it can run on a 64K Tandy CoCo running Extended Basic (July Issue).
Enquirer 50 Lime Avenue, Bentley, Walsall, W. Midlands.

Problem Sprint Compiler — Keyboard Peeks for movement, etc, do not work when Basis is compiled. (Nothing happens when key is pressed). Help rewarded!
Enquirer M R Vine, 120 Auriel Avenue, Dagenham, Essex.

Problem Using Dragondos — still have problems with the "Chain" command — sometimes the screen is frozen, so I have to reset. Can anyone help?
Enquirer Fr Geurts, Zwaanshalskade 73,3036 JZ Rotterdam, Holland.

Communication

Stuck for a routine? Need some obscure equipment? Feeling cut off? Fear not — someone, somewhere can help you! Write down your problem on the coupon below (make it as brief and legible as possible) together with your name and address and send it to Communication, Dragon User, 12/13 Little Newport Street, London WC2H 7PP. We'll publish it as soon as we can — meanwhile, maybe there's someone you can help this month!

Problem..
....
....
Name..
Address..
....

Taking Control

Your very own machine code monitor — written by ***Peter Whittaker***

ONE OF the limitations of Basic is that it does everything for you, and so hides the operation of the computer from view. If we turn to machine-code programming, we can gain full control of the machine, but we lose all of the safeguards provided by Basic. There are no syntax checks to prevent one from trying to EXEC meaningless code, and the Break key will not stop a runaway program. Even pressing the reset button will not help on every occasion. It is to help reduce these problems (especially for novices following our machine-code series) that this monitor program has been written. The program and its uses can be best explained by EXECing it and exploring what it can do. (The code lies on graphics pages two and three, so it can be used with or without a disc drive.) Load in the coed from Listing Two using the Hex Loader (Listing 1) and save with CSAVEM, "MONITOR", 3080, 5575, 3080.

Functions

The program is called by EXEC3080, and will display its option list. The available functions are: Alter memory, Examine memory, Fill memory, Copy memory, Display memory as poke text, Check memory works, Register information, Set Breakpoints, Clear Breakpoints, Jump to machine code, Goto a machine code subroutine, and Return to Basic. Each is called by pressing the appropriate key. All addresses used by the program must be given in hexadecimal. (Four digits 0000-FFFF.)

<**A**>-Alter memory from XXXX. After pressing the <A> enter a two byte address from which you wish to start altering the memory contents. The screen then clears to display four columns of information. The first is the memory address, the second the value stored at that address, the third the character given when the value is printed to the screen, and the fourth is the character given when the value is poked to the screen. The print and poke characters are not always the same. For example, PRINT CHR$(0) gives a blank, whilst POKEing a 0 to the screen produces an inverse @. The display will show several memory locations above and below the location to be changed. The memory location to be altered is indicated by the flashing cursor, and can be changed by pressing the up or down arrow keys. To alter the value stored, just type in the value. To return to the options list, press the <Break> key. This routine can be demonstrated by first entering the Basic program; **10** CLEAR 200,30000. Then EXEC the Monitor, and select the <A>lter memory routine. Give either 1E00 or 2400 as the start address, depending on whether or not you have a disc drive attached. The screen should clear to show the Basic program listed down the columns. Now change the values stored, from 200,30000 to 333,33333, and then press the <Break> key. Quit the monitor, and list the Basic program. Sure enough, it has changed to; **10** CLEAR333,33333.

<**E**>-Examine memory from XXXX. Again the program requires a two byte address (0000-FFFF) and then clears to display the information. The screen is divided into rows of blocks of eight locations. Pressing the up or down arrows will scan through the memory one line at a time, whilst pressing <Shift> at the same time will move a whole page. Pressing the <Enter> key will switch between displaying the information as ASCII characters or as numbers, whilst pressing the <Break> will, as usual, quit the routine. If you call this routine, and enter 0C00 as the start address, you can page through the Monitor program. It will probably be pretty meaningless as numbers, but if you press the <Enter> key, it will be displayed as text, and then you will be able to find the location of the monitor messages stored in memory.

A very similar function is provided by the <**P**>oke screen routine. When an address is entered, the computer will display the memory as text POKEd to the text screen, As mentioned above, printed characters are not always the same as poked characters.

Memory

The memory can be scrolled by pressing any of the arrow keys. Using the <Shift> and up/down arrows will scroll the memory through one screen page (512 bytes). Pressing the <Enter> key will print the address of the top left byte of the screen display, and then wait for a key press before continuing. Press <Break> to return to the Options screen.

<**F**>-Fill memory from XXXX to YYYY with ZZ. This routine, as implied, fills a block of memory with a value between 00 and FF. It then returns to the menu screen. This is easily demonstrated by first reserving some graphics memory (PCLEAR8) and then filling from 1E00 to 3000 with any number from 00 to FF. This can then be checked up on either with the monitor, or by displaying the graphics memory itself. (PMODE4,5:SCREEN1,0:EXEC41194) One use of this routine is to fill an area of memory above a machine code program with the value 3F. This is the code for a SoftWare Interrupt (see below), and if a runaway program jumps into this area, it will be redirected to the monitor routine.

<**K**>-Copy memory from XXXX-YYYY to ZZZZ following. This routine copies a block of memory from one location to another. It is a bit like the PCOPY command for the graphics pages, but will work with any areas of memory. It requires the start and end address of the source block, but only the start address of the destination. Once done, the program returns to the menu.

<**M**>-Memory check from XXXX to YYYY. This routine is used to check that the computer memory is working properly. It works its way from the start address to the end, poking every possible number to each address as it goes. It then checks to see whether each location has stored each number properly before moving onto the next address. If a location does not store a number properly, for example, the program POKEs a two, but the location stores a seven, it means one of two things. Either the memory location is defective, or it is not RAM but ROM, and its contents are meant to be permanent. (ROM equals $H8000 and above.) If the routine finds a defective memory location it prints a "failed" message and waits for a key press before

```
10 'HEX LOADER FOR DRAGON MONITOR.
20 'BY PETER WHITTAKER.
30 INPUT "START ADDRESS";START
40 INPUT "FINISH ADDRESS";FINISH
50 FOR N=START TO FINISH STEP 8
60 PRINT N;": ";
70 TT=0:INPUT A$:Z=0
80 FOR M=1 TO LEN(A$) STEP2
90 L=VAL("&H"+MID$(A$,M,2))
100 TT=TT+L:POKE N+Z,L
110 Z=Z+1:NEXT M
120 PRINT " = ";
130 INPUT T
140 IF T<>TT THEN PRINT"error - ENT
    ER LINE AGAIN.":GOTO60
150 NEXT N
```

Listing One

returning to the menu. Otherwise the program works through to the end address, displaying a "Passed" message all the way, and then waits for a key press before returning to the menu. To demonstrate this routine enter the block 9000-9100, and the routine will respond immediately with a 9000 FAIL message. this is because address 9000 is part of the Basic ROM, and not RAM. Try again and use addresses 0400-0420. This is the top line of the text screen, and you will see the memory being tested as the routine runs. A little lower down the screen, you will see the current address, and a PASS message. However, if you were to enter 0400-0500 as the block, although the memory would pass at first, as soon as the test reached the part of the screen where the ADDRESS PASS/FAIL message is printed, the memory would fail the test. This is not due to the memory being defective, but because the program is changing the memory contents to print the message. So, if you get a memory failed message, it does not always mean that the memory is not working properly, but a third thing — it is already being used by something else.

Control

It is with the <**B**>, set Breakpoints command, that we move from the realm of the interesting to the indispensable. As mentioned above, machine code does not have any of the safeguards of Basic to stop programs from running out of control. This routine is a help to overcome that problem. When this routine is called, it will swap the byte at the address entered, for a SoftWare Interrupt (SWI) instruction. The byte replaced is stored in a table for later restoration. When the machine code is then run, it will execute as normal, until it encounters the SWI, where the program is interrupted. All 6809 registers are stored on the "stack" and control is redirected via the interrupt vectors to the Register information routine (see below). The program can set up to ten Breakpoints, and these are all displayed on the register information screen.

Pressing the <**X**> clears all the breakpoints set using the <B> function. The previously inserted SWI commands are replaced by the original code, and the program returns to the menu. SWI commands placed using the <F>ill command or the <A>lter memory routine are not affected.

The register information screen called by the SWI command can also be accessed by pressing the <**R**> key. The screen will then clear to display the contents of all the 6809 registers (CC,A,B,DP,X,Y,U,S,PC). When called from the menu screen, they do not reveal very much about what the computer is doing, but when called by a SWI command, they give the exact state of the computer as it was before it obeyed the interrupt. This enables one to check out whether or not a piece of code is working in quite the way it should. Pressing the <**C**> key will cause the computer to continue from where it had got to. (Make sure that you are returning it to the start of a valid instruction, as the inserted SWI command replaces one byte of the machine code, whilst some instructions are three bytes long.) Pressing the <**$**> key will call the alter registers routine, whilst any other key will return the program to the Options screen. If the alter mode is selected, a flashing cursor works its way down the registers, and you must type in the desired values for each. The value entered into the Program Counter is the address to which the computer will transfer control. However, before the computer quits the routine it will wait for the <Enter> key to be pressed. Any other key will cause it to run through the register routine again. This is in case you enter the wrong values into the register.

Routine

By a careful combination of this register routine and the setting of Breakpoints, pieces of macine code can be tested with little fear of them going out of control. To demonstrate this, PCLEAR5 and the EXEC the Monitor. Select the <A>lter memory routine, and using 1E00 as the start address, and enter the machine code for Listing #2 (second column from the left). Quit the routine by pressing <Break>, and then <J>ump to the code at 1E00. As the code runs, it will come across the SWI command, and be redirected to the register information routine. Here we can observe the status of the registers. Press <C> to continue, and see if you can follow the machine code to the results displayed on the screen the next time it is displayed. Once you understand what it is doing, try experimenting with it. Press the <$> key and enter some values into the register. Make sure that the Condition Code register is set to a safe value, and that the program counter is set to return to the routine.

The last two functions are called by the <J> and <G> keys, and are the Jump to a piece of machine code and Go to a machine code subroutine. The first will leave the monitor program, and follow wherever the machine code should lead it, whilst the second will also follow the machine code but return to the monitor when it reaches the end.

To escape from the program press the <Break> key, and the computer will return to its normal functioning. (However, the interrupts and breakpoints will not be reset, so, for example, if you set a breakpoint at location 0167, the computer will return to the monitor every time you try to quit it.)

If you do not fancy typing in the program I am willing to supply copies on tape for £2.50. I will also provide a version configured to reside in high memory rather than on the graphics pages. Send a cheque to Peter Whittaker, 73 Norwich Street, Cambridge CB2 1ND.

```
MACHINE CODE LISTING

7531                    11       PRT
1E00                    20       ORG   $1E00
1E00 4F                 30 @START   CLRA
1E01 5F                 30       CLRB
1E02 8E0000             30       LDX   #0
1E05 108E0000           30       LDY   #0
1E09 8B01               40 @LOOP   ADDA   #1
1E0B C002               40       SUBB   #2
1E0D 3086               40       LEAX   A,X
1E0F 3123               40       LEAY   3,Y
1E11 3F                 40       SWI
1E12 7E1E09             50       JMP   @LOOP
1E15                    60       END   @START
```

```
3080 :8E0C77BF0107867E= 732     3248 :4FBD11508E1496BD= 866
3088 :B701068E1022BF10= 589     3256 :1101EC64FD114EBD= 891
3096 :408660BD10F38E12= 902     3264 :11738E14A6BD1101= 667
3104 :94BD1101BD800670= 790     3272 :EC66FD114EBD1173= 1007
3112 :05E327F881031027= 706     3280 :8E14B6BD1101EC68= 591
3120 :02E3814610270274= 601     3288 :FD114EBD11738E14= 831
3128 :8150102701658152= 577     3296 :C6BD11011F40FD11= 770
3136 :2732814A102702B0= 525     3304 :4EBD11738E14D6BD= 964
3144 :8145102702D0814B= 667     3312 :1101EC6AFD114EBD= 897
3152 :102701FA81421027= 556     3320 :11738E14E6BD1101= 731
3160 :03A08158102703E2= 654     3328 :8E05A3BF00888E10= 795
3168 :814D102703F98141= 707     3336 :22BC10402714EC81= 726
3176 :1027051C81471027= 343     3344 :FD114EBD11733001= 718
3184 :027520B03F20A286= 718     3352 :8620BD800CBD800C= 824
3192 :60BD10F38E143FBD= 958     3360 :20E7BD800627FB81= 1005
3200 :1101A6E4B7114FBD= 830     3368 :24270A814327058E= 467
3208 :11508E1466BD1101= 568     3376 :0C19AF6A3B8E0454= 607
3216 :A661B7114FBD1150= 828     3364 :BF0088BD1116B611= 754
3224 :8E1476BD1101A662= 751     3392 :4FA7E48D52BD1116= 925
3232 :B7114FBD11508E14= 727     3400 :B6114FA7618D48BD= 944
3240 :86BD1101A663B711= 806     3408 :1116B6114FA7628D= 723
```

Listing Two

```
3416 :3EBD1116B6114FA7= 735
3424 :638D34BD110BFC11= 778
3432 :4EED648D2ABD110B= 815
3440 :FC114EED668D20BD= 1048
3448 :110BFC114EED688D= 857
3456 :168D14BD110BFC11= 669
3464 :4EED6ABD800627FB= 1034
3472 :810D1026FF9F3BFC= 921
3480 :0088C4E0C30034FD= 1056
3488 :0088398E141BBD11= 588
3496 :01BD110B10BE114E= 519
3504 :8E0400ECA1ED818C= 1049
3512 :060025F7BD800627= 652
3520 :EB81031027FE5281= 887
3528 :0A271A815E272381= 501
3536 :09272C8108273481= 449
3544 :0D2759815F273881= 589
3552 :5B274220D710BE11= 666
3560 :4E31A8E010BF114E= 821
3568 :208A10BE114E31A8= 736
3576 :2010BF114E20AD10= 555
3584 :BE114E313F10BF11= 621
3592 :4E20A110BE114E31= 621
3600 :2110BF114E209510= 532
3608 :BE114E31A9020010= 521
3616 :BF114E208710BE11= 676
3624 :4E31A9FE0010BF11= 774
3632 :4E16FF788E0401BF= 813
3640 :00888E142CBD1101= 549
3648 :BD1173860DBD800C= 797
3656 :BDA0E916FF5E8E15= 1117
3664 :33BD1101BD110B10= 496
3672 :BE114E8E140CBD11= 665
3680 :01BD110BFE114E8E= 709
3688 :140CBD1101BD110B= 455
3696 :10BC114E2C1E11B3= 569
3704 :114E250316FD9A33= 615
3712 :41FF0FF7BE114EA6= 1033
3720 :A0A78010BC0FF725= 958
3728 :F616FD8510BF0FF7= 1123
3736 :BE114E30013341A6= 616
3744 :C2A78211B30FF72E= 995
3752 :F616FD6D8E14106D= 997
3760 :1101BD110B10BE11= 459
3768 :4E8E140CBD1101BD= 648
3776 :110B8E140CBD1101= 409
3784 :BE114EBD1116B611= 712
3792 :4FBF114E10BC114E= 664
3800 :102CFD3DA7A010BC= 905
3808 :114E25F816FD328E= 847
3816 :159ABD1101BD110B= 599
3824 :BE114EAD8416FD21= 898
3832 :8E1500BD1101BD11= 576
3840 :0BBE114E327EAFE4= 875
3848 :39810A1027009B81= 535
3856 :5E102700A0866010= 555
3864 :8D01D87E83718E15= 891
3872 :20BD1101BD110BBE= 646
3880 :114EBF0FF78660BD= 967
3888 :10F3C61034048E04= 675
3896 :005F02888E0FF7BF= 970
3904 :114EBD1173862080= 771
3912 :800CBD800CB60FF9= 915
3920 :2679C608A680B711= 859
3928 :4FBD11508620BD80= 848
3936 :0C5A26F035045A27= 566
3944 :09860DBD800C3404= 541
3952 :20CDBD800627BB81= 915
3960 :031027FC9C815F27= 729
3968 :12815B2719810A27= 480
3976 :21815E2728810D27= 516
3984 :2F209FBE0FF73088= 874
3992 :80BF0FF72094BE0F= 966
4000 :F7308900808F0FF7= 1013
4008 :2088BE0FF73008BF= 867
4016 :0FF716FF7DBE0FF7= 1116
4024 :3018BF0FF716FF72= 916
4032 :B60FF98801B70FF9= 1030
4040 :16FF67C6088620BD= 941
4048 :800CBD800CA68081= 892
4056 :202505BD800C2005= 440
4064 :8620BD800C5A26E5= 852
4072 :35045A2785340486= 509
4080 :0DBD800C16FF4800= 691
4088 :00008E153FBD1101= 433
4096 :BE10408C10401027= 545
4104 :FC0FBD110BFC114E= 831
4112 :ED811F02A6A4A780= 1024
4120 :863FA7A4BF104016= 821
4128 :FBF7000000000000= 498
4136 :0000000000000000= 0
4144 :0000000000000000= 0
4152 :0000000000000000= 0
4160 :10228E10228C1040= 510
4168 :1027000AEC811F02= 463
4176 :A680A7A420EF8E10= 1054
4184 :22BF104016FBBA8E= 906
4192 :1553BD1101BD110B= 528
4200 :BE114EBF10EF8E14= 893
4208 :0CBD1101BD110BBE= 626
4216 :114EBF10F18650BD= 962
4224 :10F38E1562BD1101= 727
4232 :10BE10EF10BC10F1= 922
4240 :2E554F34023502A7= 486
4248 :A434028E0424BF00= 591
4256 :8810BF114EBD1173= 759
4264 :8E042BBF0088A6A4= 846
4272 :B7114FBD11508E04= 711
4280 :31BF008835023402= 485
4288 :A1A427108E157EBD= 858
4296 :1101BD800627FB35= 684
4304 :0216FB458E1579BD= 817
4312 :110135024C270434= 244
4320 :0220B2312120A5BD= 680
4328 :800627FB16FB2A00= 739
4336 :0000008E0400BF00= 337
4344 :89A7808C060025F9= 863
4352 :39A6802705BD800C= 724
4360 :20F7398D09B6114F= 764
4368 :B7114E8D01398D0F= 633
4376 :C6103DF7114F8D07= 766
4384 :BB114FB7114F3960= 715
4392 :9F0088BD800627F7= 904
4400 :1F89813025F18146= 822
4408 :2EED8030810A2506= 641
4416 :811125E380071E89= 712
4424 :BD800C1E89391640= 639
4432 :B6114F4444444481= 679
4440 :0A25028B078B30BD= 571
4448 :800CB6114F840F81= 694
4456 :0A25028B078B30BD= 571
4464 :800C39B6114F3402= 529
4472 :B6114EB7114F8DD0= 905
4480 :3502B7114F8DC939= 733
4488 :8E1583BD1101BD11= 707
4496 :0BBE114EBF159886= 794
4504 :60BD10F38E0400BF= 881
4512 :0088BE159830198F= 763
4520 :114E8620BD800CBD= 779
4528 :11738620BD800CBD= 816
4536 :800CBD800CBD800C= 798
4544 :A684B7114FBD1150= 863
4552 :8620BD800CBD800C= 824
4560 :BD800CBD800CA684= 956
4568 :810D2703BD800CF6= 759
4576 :0089C4E0CA15F700= 1027
4584 :89A79F00887C0089= 860
4592 :860DBD800C3001FC= 777
4600 :0088108305E025A7= 716
4608 :8E0400BF00888E15= 636
4616 :ABBD1101CC04E9FD= 1072
4624 :00887004E9BD8006= 808
4632 :27F881031027F9F9= 972
4640 :815E2765810A2756= 627
4648 :1F89813025E48146= 809
4656 :2EE0813A25068141= 694
4664 :25D8800780301E89= 731
4672 :BD800C1E89484848= 712
4680 :48B7114FBD800670= 786
4688 :04EA27F881031027= 712
4696 :F98F1F89813025EC= 1058
4704 :81462EE8813A2506= 707
4712 :814125E080078030= 766
4720 :BB114FBE1598A780= 941
4728 :BF159816FF19BE15= 877
4736 :98301FBF159816FF= 872
4744 :0EBE159830018F15= 638
4752 :9816FF0328432920= 612
4760 :434F505952494748= 613
4768 :5420502E20574849= 506
4776 :5454414B45522031= 540
4784 :3938352020202020= 326
4792 :2020202044524147= 414
4800 :4F4E204D4F4E4954= 580
4808 :4F520D0D2041202D= 361
4816 :20414C544552204D= 517
4824 :454D4F5259204652= 580
4832 :4F4D20585858582D= 585
4840 :0D2045202D204558= 380
4848 :414D494E45204D45= 540
4856 :4D4F52592046524F= 590
4864 :4D20585858582D0D= 519
4872 :2046202D2046494C= 430
4880 :4C204D454D4F5259= 581
4888 :20585858582D5959= 607
4896 :5959205A5A0D204B= 510
4904 :202D20434F505920= 456
4912 :585858582D595959= 664
4920 :5920544F205A5A5A= 586
4928 :5A2D0D2050202D20= 369
4936 :4449535044415920= 566
4944 :415320504F4B4520= 515
4952 :5445585420585858= 621
4960 :582D0D204D202D20= 364
4968 :4D454D4F52592043= 572
4976 :4845434B20585858= 579
4984 :582D5959590D20= 534
4992 :52202D204558414D= 499
5000 :494E452052454749= 547
5008 :53544552530D2042= 512
5016 :202D205345542042= 443
5024 :5245414B504F494E= 601
5032 :54532058585858 0D= 564
5040 :2058202D20434C45= 441
5048 :415220425245414B= 535
5056 :504F494E54530D20= 522
5064 :4A202D204A554D50= 499
5072 :20544F2058585858= 579
```

```
5080 :0D2047202D20474F= 375
5088 :20535542524F5554= 596
5096 :494E452058585858= 604
5104 :0D203C627265616B= 622
5112 :3E20455849542054= 524
5120 :4F2042415349430D= 478
5128 :203E3F00202D2000= 266
5136 :46494C4C2046524F= 558
5144 :4D20002044495350= 445
5152 :4C4159204652404D= 570
5160 :202D20002D414444= 355
5168 :5245535320455155= 584
5176 :414C532026480020= 398
5184 :2020202020205245= 343
5192 :4749535445522053= 577
5200 :544154455530D0D20= 459
5208 :4343205245474953= 544
5216 :5445522020000D20= 344
5224 :2041205245474953= 507
5232 :5445522020000D20= 344
5240 :2042205245474953= 508
5248 :5445522020000D20= 344
5256 :4449524543542050= 555
5264 :4147452020000D20= 314
5272 :2058205245474953= 530
5280 :5445522020000D20= 344
5288 :2059205245474953= 531
5296 :5445522020000D20= 344
5304 :2055534552205354= 550
5312 :41434B2020000D20= 316
5320 :2053595354205354= 570
5328 :41434B2020000D20= 316
5336 :2050524F4720434F= 522
5344 :554E542020000D0D= 337
5352 :425245414B504F49= 589
5360 :4E54532053455420= 545
5368 :41542E2E2E2E2E00= 379
5376 :204A554D5020544F= 543
5384 :202D200020505249= 376
5392 :4E54205445585420= 551
5400 :46524F4D202D2000= 417
5408 :204558414D494E45= 551
5416 :204D454D4F525920= 537
5424 :46524F4D202D2000= 417
5432 :20434F5059200020= 411
5440 :5345542042524541= 550
5448 :4B504F494E542041= 566
5456 :542000204D454D4F= 450
5464 :525920434845434B= 553
5472 :2000204144445245= 416
5480 :5353202042595445= 538
5488 :2020535441545553= 548
5496 :0050415353004641= 446
5504 :494C00414C544552= 525
5512 :204D454D4F525920= 537
5520 :46524F4D202D2000= 417
5528 :0000474F53554220= 416
5536 :4144445245535320= 550
5544 :2D20004144445245= 429
5552 :535320434F444520= 513
5560 :5052494E5420504F= 588
5568 :4B45000000000000= 144
```

Pure Speculation!

This year's Budget gave a boost to small investors — so **Brian Cadge** *was asked to take stock of Sharebox*

IF YOU are already an investor in stocks and shares, or are just thinking of entering the world of "Capital Gains, Dividends and Forecasts" then *Sharebox* from Harris Micro Software is worth taking a look at.

Sharebox is a share management program which will help you keep on top of all your holdings of stocks and shares, helping to analyse their performance over the year. As with most of Harris's software, *Sharebox* uses their own custom 42×24 screen and keyboard driver. The character set has been improved and now gives a noticeably cleaner looking text. The keyboard driver includes autorepeat and a disabled break key. The key repeat rate can be altered by the user, as can the background colour of the text screen (although the default settings seem to be ideal).

The share management software actually consists of two programs: *Sharebox* and *Sharerep.* These can be run individually, or called from each other. *Sharebox* deals with the creation of files and their maintenance, while *Sharerep* is used for the creation of all reports.

Both programs are menu/form-fill driven and include some limited error checking. This consists mainly of having three input types: numeric, date and alphabetic. There is also some checking of numeric values at key points of input, although one point I found irritating was that the program will not accept "3/2/86" as a valid date; "03/02/86" must be used.

Screen

The screen is divided into three sections, the top line displays the option heading, program name, and data type of the input required (eg NUM for numeric), and the bottom line is used for options selection, error and help messages. The main section of the screen is used for the menus, forms and reports. When entering data the cursor keys can be used to edit the current field, or move to the next or previous field. Shift-down arrow gives a line of "help" at the bottom of the screen, which usually consists of an explanation of the data type required, and shift-up arrow returns to the main menu immediately (for aborting incorrect entries).

After an initial sign-on message, *Sharebox* presents a main menu screen consisting of nine options. The first option to be used must be either "Create new file" or "Open existing file". Up to 99 separate files of various lengths can be opened on each disk (providing there is enough disk space). Each file is selected by its file number, and optional password. A filename is also given; this is printed at the top of reports, etc, but is not the actual filename given to the disk file.

Each share record is identified by a "short name" of up to eight characters, used to sort and retrieve the records. For example, "UtdNews" could be used as a short name for "United News". When retrieving a record, once a match is found for a short name, the user is allowed to accept this record, continue the search or look at the preceding or next record. If no match is found then the "nearest" is offered.

Records

Within the share record are fields for full name, security code, group number, dividend months (up to 4), estimated yield per cent, purchase price, current price, number of shares held, capital gains, tax credits and dividends. The share prices may be quoted in pounds or pence (up to a maximum of 999.99 in pence). There are 30 group numbers, covering most types of shares. This group number can be used with the short-name for selection of particular records within the reports program. Any field of a share record can be changed at a later date (apart from the short name) either by directly selecting the "charge record" option, or automatically from within other options.

Sharebox handles 12 "periods" of time, keeping the prices of the shares for each record for each period. Once the 13th period is started, the price of shares in the first is lost and so on. This information is again used within the reports program. The length of time between one period and the next is entirely up to the user, and need not be the same for each period.

Once all the initial data has been entered, it is a simple matter of keeping the files up to date with share prices for the current period, and any buying or selling you do. One of the problems with *Sharebox* appears when you select the option to buy some more shares. A share record can only hold one purchase price, and one value for the number of shares held. However, you will more than likely buy more shares at a later date, and at a different price. Harris suggests that users use different share records for different "vintages" of share purchases, and although this will work, it seems a bit of an annoying fudge.

This problem also affects the "Sell Shares" option. This asks for the number of shares to be sold and the selling price. From this it calculates the capital gains made by the sale. This will be incorrect if the shares sold were bought at a different price from the original purchase price. The program gives you the opportunity to type in the correct capital gains if that calculated is incorrect. The share record is then updated with the new holding and capital gains for the year. The user is allowed to start a new year at any time, and so zero the current values of dividends, capital gains and tax credits.

Dividends received are entered by selecting option six. The program prompts for the income received and the tax credit. This information is then added into the particular share record.

All reports from the share management system are produced by the other program on the disk, *Sharerep.* There are six different reports that the program can produce for each file. The data to be included in a report can be selected by range of short name, and by range of group number. Some reports also allow selection by range of period or months. All reports

```
SHAREBOX      Postings Program          NUM

              MAIN OPTIONS

1   ...   Create New File
2   ...   Open Existing File
3   ...   Buy Shares
4   ...   Change Share Record
5   ...   Sell Shares
6   ...   Receive Dividend
7   ...   Change Share Prices
8   ...   Run Reports Program
9   ...   End Program

TYPE CHOICE (1-9) <█>
```

can be sent either to the screen or printer, output to printer being generally more detailed, taking advantage of the full 80 columns and is automatically paged for 11" paper. One limitation is that only one file may be accessed at once; there is no cross-referencing to other files.

Briefly, the different reports provided for are as follows. Firstly, there is the "List Share Valuation" option. This produces a report on the valuation of shares, from two different periods, and the profit or loss resulting. The default values for the two periods are the original purchase price (period 0) and the current price (period 12).

The "List Capital Gains" option shows all share records which contain capital gains or losses (ie, during the current year). The "List Dividends Received" option shows all the dividends and tax credits received to date in the current year, and calculates the yield percentage (the dividends as a percentage of the holding at the current price).

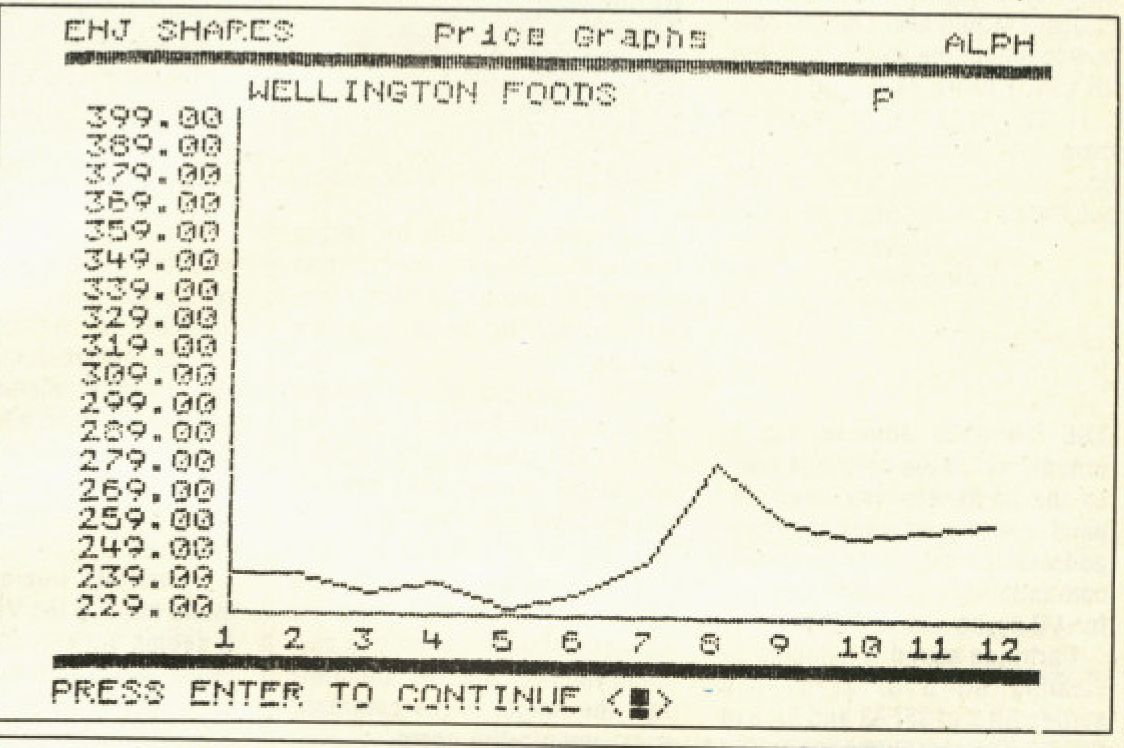
A potentially useful report is the "List Income Forecast". This will show all the shares which are expected to pay dividends within the range of months selected, and will estimate the dividend received.

Price changes in shares over a period of time can be shown with the next option. The default for the period is from the original purchase to the current price. The report shows the start price, end price and the percentage change.

The final report allows a graph to be drawn of the price changes of particular shares over the 12 periods. This gives a visual indication of their performance. If the screen is selected then a simple line graph is drawn, on a printer the graph is drawn using "*" characters. Because of the vast differences in share prices, different scales are used on different graphs, therefore one has to be careful when comparing output for different shares to take into account the scale.

Overall, *Sharebox* functioned extremely well under all tests. The displays are clear and well laid out and the data structure seems sensible. The 30 page A4 manual is up to Harris' usual high standard, explaining each step clearly, with a useful contents page at the beginning. Apart from the fairly minor problem of having to have different "vintages" of shares, I would happily recommend *Sharebox*. The program deserves to do well, but just how large a market there is for software such as this on the Dragon remains to be seen.

***Program:** Sharebox Share Management Program.* ***Requires:** Dragon 32/64 and Dragondos/Cumana Dos 2.0 and optional printer.* ***Price:** £16.99.* ***From:** Harris Micro Software, 49 Alexandra Road, Hounslow, Middlesex, TW3 4HP. (Tel: 01-570 8335.)*



Talking Port

I AM building a speech synthesiser from my Dragon 32 for use in conjunction with the cartridge port. What I need to know is how to send and receive data via the port, ie, what memory addresses to use. I would also like to know how to output the sound input pin 35 (SND) to the television.

I have tried to find the answer in many Dragon related books, but none of them even touch on the subject of the cartridge port.

Brian Campbell
69 Southern By-pass
North Hinksey
Oxford
OX2 OLA

THE full 6809 address bus is brought out to the cartridge port, so the addresses you need depend entirely on your interface address decoding. To maintain compatibility you should arrange for I/O to be above 65280.

Cartridge sound is selected by clearing Bit 3 of $FF01 and setting Bit 3 of $FF03 and Bit 3 of $FF23. The signal applied to Pin 35 should be suitable for feeding directly into the sound multiplexer.

New Command

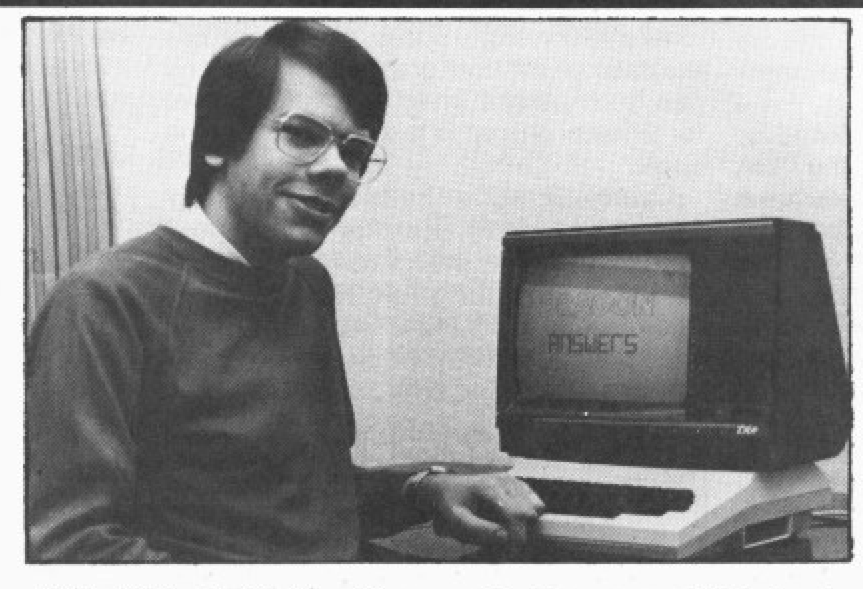
IN JANUARY 1986 *Dragon User*, I have just read that there are three variable routines, CKcome, CKcbrak and CKopbrack, but there is no variable routine for checking for quotes on the command line, eg, VERIFY "Intro". What is the routine for checking for variables for the quotes?

Also, is it possible to change existing Basic command to your own commands, ie, NEW to NOW.

Michael Clark
84 Woodland Road
Halewood
Liverpool
Merseyside
L26 1XF

IF YOU just want to check for a quote character, then the routine you need is CKchar at address 35244; the B register should contain 34 on entry.

More likely, you need the routine GetVar at address 35476,



which will deal with the string variable, whether in quotes or as a variable name. See the Firmware series for details on this routine.

It is possible to change the Basic commands to your own. To do this you must copy the ROM's command name and address tables down into RAM and alter the pointers at 289/290 and 291/292 accordingly. You can now POKE into the name table to change command names to anything you like, with the constraint that the length of the command must remain the same.

Monitor

RECENTLY I purchased a 'Green Monitor' for my Dragon 32 computer, but it seems that this monitor is not fully compatible with the Dragon.

The problem is that the quality of the picture reproduced on the screen, especially when the Dragon is in the text mode, is such that text appears to 'flicker' quite a lot, and only when I tune it down with the 'contrast button' can I really read very faintly whatever is on the screen. A friend of mine suggested that I should take the colour chip off its housing in order to improve the quality of picture because it is this chip which is causing all the interference.

Michael Rerriggi
36 Leone Str
Sliema
Malta

SEVERAL problems could be causing the symptoms you describe with the monitor. Firstly, the Dragon's monitor output has an impedance of 370 ohms, and some monitors require 75 ohms. A suitable lead can solve this problem.

Another cause of flickering is the mains frequency, which must be compatible with both the computer and monitor to keep the display syncronised. However, the Dragons' display in never particularly good when fed into a green screen monitor unless the text is inverted — black on bright green just does not seem to work very well.

I certainly would not recommend moving the Video chip, as it seems unlikely that this could cause the problem, and in any case you should seek expert advice before interfering with any chips or your could end up with no display at all!

Recover

I OWN a Dragon 32 and would like to be able to recover Basic programs after using the command NEW. I have used POKE 25,30 and POKE 26,30 as I have been told that memory locations 25 and 26 hold the Basic program.

So far I have only been able to recover just some of the old program. I don't know the correct values to reset these locations with. Please could you tell me the right values or tell me how to recover my programs any other way within Basic.

Michael Gwynne
Dorwell
Swainshill
Hereford

Basic programs can be recovered providing that you have not entered any program lines since typing NEW. Type in the following line as a direct command and wait for the OK prompt to appear (this may take several minutes for a long program).

```
FOR I=PEEK(25)*256+PEEK(26)
TO 32767: IF PEEK(I)+PEEK(I+I)
<> 0 THEN NEXT
```

Next type the following, again as a direct command;

```
I=I-3:POKE 27,INT(I/256):POKE
28,I-PEEK(27)*256
```

The program should now be restored, and can be listed.

Disks

I HAVE just recently purchased a Cumana Disk Drive and DOS. What I want to know is, will the Dragondos Disks you can buy from software companies work on the Cumana Disk system, as I am not sure and I don't wish to buy any disks until I know the answer.

Michael Holloway
3 The Mount
Edenthorpe
Doncaster
South Yorkshire

CUMANA Dos 2.0 uses the same disk format and commands as Dragondos 1.0, and is compatible with most programs. I say most programs, as I have not had a chance to study the Cumana ROM in detail. Basic programs should be no problem, but my best advice would be to check before ordering a program.

Routine

I AM currently writing a database program for the Dragon 64 and Dragondos. I want to be able to access the extra 32K from machine code, but I have no idea how to go about this. Could you please write a small routine to demonstrate how to use the extra RAM?

Sarah Lock

THE EXTRA 32k of RAM is paged in from 32768 to 65279 by writing to address $FFDF. The ROM's can be re-selected by writing to $FFDE. When accessing the extra RAM with Basic/Dos running, it is necesary to disable interrupts as these would cause the program to crash when the ROM's are disabled.

You could incorporate the routine below into your own program. This will return the byte at address X in RAM in the A register. A similar routine can be written to store a byte at address X by replacing the LDA with STA.

```
ANDCC  #239
STB    $FFDF
LDA    ,X
STB    $FFDE
ORCC   #16
RTS
```

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ONE OF the ways round the lack of new adventure releases for the Dragon is, of course, for people to start writing their own. I do receive home-grown adventures quite often, and though I always respect the amount of hard work that goes into creating them, the majority do have to be sent back with a letter of criticism, as I can't give space in the column to an adventure that isn't fully de-bugged and that I can't recommend other readers to buy.

Just occasionally, however, one comes along that's a little bit special and I'm glad to draw people's attention to it. The last was one called *The Wierds of Kesh* that arrived several months ago, and which has now been published by Quickbeam Software. I'll be taking a longer look at that next month, but this month I'm happy to recommend an adventure called *Space Trek I* from reader M. Edwards, who's decided to call himself Broomsoft. He told me the adventure took him about 30 hours of programming time, and about 10 hours of preparation, and it's that preparation which shows. A lot of thought has gone into this game, and it shows that you can still come up with something different if you set your mind to it, although I'd like to see the title changed to something a little less obvious.

The first part of the program loads in the optional instructions and mission briefing, and though the cassette inlays weren't ready with my review copy, it's good to see that the provisional inlay was quite detailed and the instructions on-screen are comprehensive and also invite you to write to Broomsoft for help, if stuck (well, it makes my life easier!).

Mission

The scenario might just sound vaguely familiar to you, that the fifth starship, the Endeavour, was launched in 2082 in order to find the previous four, all gone missing. Only two months after the launch the crew (well, most of the crew) has fallen ill with something nasty called Rigellian Fever. The only known cure is an antitoxin distilled from Ryetalyn, which you don't happen to have in your medicine cupboard right now. Nor do you have the distilling equipment you'll need to produce a perfect and pure antitoxin. Fortunately Ryetalyn has been located on the planet Holberg by your Science Officer, Mr Selvon, who sounds like something you buy at the chemist to rub on chapped lips. You've got permission from Starfleet HQ to land on Holberg, so over to you the Adventure Player.

The unusual thing about this adventure, for a Dragon game at any rate, is that you actually control four characters. You're given a menu screen initially inviting you to choose the one you start off with, but in playing the game if you type MENU as a command, you can switch to one of the other characters. As happens in *The Heroes of Karn* on the Spectrum, Amstrad and other machines, only certain characters can perform certain tasks, so if you're having no luck with one, try asking another to do it. The instructions say that only Selvon can nervepinch someone, and I can't wait to encounter someone who seems worth nervepinching.

Characters

The characters all start in different places, and the response time as you switch between them is very quick indeed. Captain Christopher James, for instance, begins in the command seat with a row of labelled switches in front of him. He can see his Captain's Com-Unit and exits going North and East. One criticism of the game is that the screen display could do with tidying up. "EXIT GO: N: E:" doesn't look very good, and neither does the title being printed at the end of the first location description.

Back to the Com-Unit, however. If you examine it you see it has five buttons: three to summon the other main crew members, one to summon a security guard and one to switch the machine off. You might want to summon one of the other members to try their luck with a task you're finding tricky in your current incarnation, so you press the appropriate button and your location description is updated so that you can also see the second character. Switch to them to try solving the problem, and naturally they can also see the first character in their location description. Very neat work.

With James in the command seat, Selvon at the Scientific Officer's main post, Engineer Hamish McCrindle in the engineering section and Spears in the sick bay (don't panic, he's the doctor), away you go. The next reason for enjoying this adventure is the trouble that's been taken to give you the feeling that you're actually in a spaceship. The location descriptions are only brief, but there are plenty of them, interconnecting nicely, and with other characters in different parts of the ship this is all very effective.

You'll need your mapping skills and lots of paper, because there are at least six levels of the ship, with a lift to take you between them. Step out of the lift on the first floor and you're on the bridge, with exits leading East, West and South back to the lift. There are exits in all directions if you emerge on Level Two (the sick bay), Level Three (a corridor) or Level Six (the transporter room). The other two levels take you to the engineering section and the shuttlecraft. In addition to that, though, and all the locations that are on each level, you can also climb between floors using the service hatches. I found such a hatch on Level Four, went through it and up a ladder, crossed over and climbed down a service vent and there I was on Level Three, where I had a brief encounter in the briefing room.

I can't tell you much about the problems as yet, because I've been spending my time trying to map out this spaceship, just making a note of where various objects like tools and protective clothing are. There is a SAVE option, and apart from the screen layout and a vocabulary that could be extended a bit, I think this is an excellent adventure. I've no doubt that in a healthier climate for Dragon software the author would have found a larger software house to publish it, but he's duplicated copies himself and they're available for £4 from Broomsoft, 30 Broomhills, Welwyn Garden City, Herts AL7 1RF. Worth every penny, and I hope to be looking at *Space Trek II* next month.

One thought that occurs to me, and which I throw out to any enterprising software houses that might be reading: compilations are the thing at the moment, and a company called Global Software has just published a four-pack of Spectrum adventures that have already been released but rather neglected, which is excellent value at £7.95. Why not the same for Dragon adventures? There's plenty of good material out there, some of it no longer easily available, and I know from the size of my mailbag every month that there's still a large potential market. How about it, someone?

Devoting all that space to one new adventure means I'll have to try to cram everything else into the last few column inches. A lot of readers needing help, so

maybe you can pitch in and sort them out if I can't. This is a two-way thing, remember, so if you've ever received a clue from anyone, see whether you can't do the same for another adventurer.

Richard Read, 37 Edgeworth Drive, Fallowfield, Manchester M14 6RU having trouble gazing into the yellow pool in *El Diablero*. Try another colour, Richard.

S. Goodman, 40 Albany Road, Earlsdon, Coventry CV5 6LU asks about Salamander adventures he was trying to track down: *Franklin in Wonderland* and *White Cliffs of Dover.* A few copies of the former are around, but the review copy I received of the latter responded with an "Out of Memory" error when loaded. I doubt if finished copies were made available, as it was at the time when Salamander were cutting back on Dragon releases. Anyone seen one? This reader also thinks he's solved *Jerusalem Adventure*, but having found treasures he's got nowhere to put them (no comments please) and can't score more than 10/100. Over to you.

Julian Bain wonders if anyone can let him have a copy of the instructions for Dragon Data's *Adventure Trilogy*, which he bought at the First 6809 Show. All he's done so far is stand in an arena and get killed. Any help to Julian at Howells Cottage, Friday Street, Rusper, West Sussex RH12 4QA.

G. Ashenhurst of 49 Fosseway, Syston, Leicester LE7 8NF offers help on *Dragon Mountain*, but is stuck in *Sea Quest*: how to get the scuba gear, and if you need a credit card then where is it? WODN IWOG NEHT ESUO HHCA EBNI WODN IWKA ERB is all I have to say to you Mr Ashenhurst.

Darren Farr of 12 Preston Court on the wonderfully named Lumbertubs Estate, Northampton NN3 4HQ, is playing *Juxtaposition* and having no luck getting into places like the fort, shaft and pyramids. Looking at my maps, I think it's just a case of typing ENTER, Darren. If that's wrong, perhaps some reader would put Darren right, if only for the pleasure of addressing an envelope to the Lumbertubs Estate.

N. Nicholls, 10 Wensum Way, Belton, Gt Yarmouth, Norfolk NR31 9NY; how to cross the bridge in *Trekboer*, escape security robots in *Lost in Space* and enter skull in *Mountains of Ket.* Dominic Dickensen, 23 St John's Road, Rowley Park, Stafford ST17 9AS; in *Black Sanctum*, what to do with ash the Bishop's ghost gives you, and what use is the woman?

Gary Coggins, 65 Faringdon, Glascote Heath, Tamworth, Staffs: various problems on *El Diablero* and needs a gun in *Mansion of Doom.* Richard Heath just wants to see his name in lights, or *Dragon User* anyway, but also needs help in several places in *Trekboer* and *Juxtaposition*, and wants to know where to buy *Sea Quest, Shenanigans, Calixto Island* and *Black Sanctum.* In a word, Richard: RETSAMHCUOT. Sorry, can't get out of the habit; Touchmaster; that's Unit 9, Beglan Industrial Park, Beglan, Port Talbot, West Glamorgan SA12 7DJ. Telephone Briton Ferry 820310. Richard's at 66 Newcastle Road, Leek, Staffs.

And I'm at the end of the column. Isn't it clever the way it always finishes at the bottom of the page. I don't know how we do it.

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline, 12/13 Little Newport Street, London WC2H 7PP. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trail to write to as well!

Adventure ....

Problem ....

....

Name ....

Address ....

.... **May 86**

Adventure Contact

Adventure Juxtaposition **Problem** I have been to brown and have the Deeds of Brown. What do I do with the cryo belt and the transmat receiver? How do I get the emerald without dying? **Name** Stuart Chambers **Address** 13 Haycome, Durweston, Blandford, Dorset DT11 0PZ.

Adventure Shenanigans, Ring of Darkness, Mansion **Problem** I can't find the Gold Token or Knife. How to get out of the apartment? How to open the door? **Name** Ian Greenhalgh **Address** 162 Albert Street, Millom, Cumbria LA18 4AB.

Adventure Trekboer **Problem** How do I use the teleport and how do I open the access panel in the environmental control? **Name** Paul Marlow **Address** 50 Lime Avenue, Bentley, Walsall, West Midlands W52 0JP.

Adventure Franklin's Tomb **Problem** I have reached the main hall, have been in many rooms, cannot get out. Help! **Name** Hywel Perkins **Address** 13 Thomas Street, Trethomas, Newport, Gwent.

Adventure Shenanigans **Problem** How do you get out of the apartment? **Name** Russel Regan **Address** Levens Cottage, 2 Mellbecks, Kirby, Stephen, Cumbria.

Adventure Shenanigans **Problem** Can't get past the pub stage. What significance the muggers and police? What does the billboard say? **Name** T Jenkins **Address** Llys Helyg, Newport, Pembrokeshire SA42 0QZ.

Adventure Juxtaposition **Problem** Can't find Deeds of Brown or how to get away with the Eridani Emerald. **Name** Paul Dixon **Address** 108 Longfellow Road, Lower Gornal, Dudley, West Midlands OY3 3EH.

Adventure Lost in Space **Problem** How do I get the ship to land? **Name** Jonathan Gill **Address** 16 Collingham Green, Little Sutton, South Wirral, Cheshire.

Adventure Juxtaposition **Problem** How do you get the emerald? **Name** Paul Marsh **Address** 7 Earlsmead Crescent, Cliffsend, Ramsgate, Kent CT12 5LQ.

Adventure Return of the Ring **Prblem** How can you get the Magic Grain Sack from Human Village without them laying land mines? **Name** Geoff Lorimer **Address** 1 Deepdale Drive, Morton Park, Carlisle CA2 6LS.

Adventure Mansion of Doom **Problem** When I shoot the werewolf the route down disappears. What should I do? **Name** G Lorimer **Address** 1 Deepdale Drive, Morton Park, Carlisle.

Adventure Juxtaposition **Problem** Where is the Yellow ID Tag? Where is the nighteye droid? How do you get into the tower? **Name** Richard Marsh **Address** 7 Sandalwood, St Nicholas-at-Wade, Thanet, Kent C17 0PE.

Adventure Trekboer + Juxtaposition **Problem** How do you get across the chasm? How do you get off the second balcony? **Name** Mark Craven **Address** 39 Lincoln Road, Washingborough, Lincoln LN4 1EG.

Adventure Mystery of Java Star **Problem** Cannot find ruby on ship **Name** Peter Reefe **Address** 7 Rochester Avenue, Feltham, Middlesex.

Adventure Caverns of Doom **Problem** How do you keep your flashlight alight? What do you do after you've swum the pond? **Name** Peter Reefe **Address** 7 Rochester Avenue, Feltham, Middlesex.

Adventure Calixto Island **Problem** How do I get the oars from the serpent in the temple? How do I get the keys from the trader on the beach? **Name** Gary Turner **Address** 102 Westgate Road, Belton, Doncaster.

Adventure Castle Adventure **Problem** How do I break the glass in the North Exit? How do I open the small box? How can I take the small box? **Name** Gary Turner **Address** as above.

Adventure Quest **Problem** How do I cross the river? **Name** Gary Turner **Address** as above.

Adventure El Diablero **Problem** I've been everywhere but can't seem to do anything **Name** Gary Turner **Address** 102 Westgate Road, Belton, Doncaster.

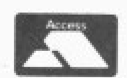
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The Numbers Game

***Gordon Lee** makes a connection between cornflakes and maths — with 20 Blaby games at stake!*

LAST MONTH I concluded with a question of probabilities involving three boxes and six marbles. The answer to the question as posed is that you would be most unwise to accept the bet at evens odds, as there is only a one in three chance of you winning the bet provided that the colour of the hidden marble is given as being of the same colour as the one that has been revealed. In this case the bet is really that the box chosen will be one of the two with like-coloured marbles, as opposed to the chance of selecting the single box with the unlike marbles. Looked at another way, at the outset there are six marbles — three of each colour. If the revealed marble is red, then the chosen box cannot be the one with the two white marbles, so two white marbles can be removed from the reckoning. This means that of the three marbles that are still hidden, only one is white and two are red. Therefore, in this situation always insist the the colour is guessed *before* the marble is removed!

Odds

When assessing odds in everyday life it comes as no surprise to find that the total winning expectation is usually in direct proportion to the odds. For example, a bet of say, one pound, on a horse race will have a relatively high chance of success (as there are a limited number of horses running in a race), but the total amount won will be proportionately small. Conversely, the same amount staked on the football pools *may* hit the jackpot, but, of course, the odds against this happening are many, many times greater. The actual prediction of the odds in these cases is difficult due to external influences, but in games such as roulette for example, the winning odds paid are directly related to the probability of the bet winning. Thus, the red/black, even/odd, high/low type of bet pays off at evens, a bet on a single number will win, at 35 to 1. If it were not for the "zero" compartment on the wheel, these would be classed as "fair" odds when assessed against the probabilities involved. However the "zero" (and in American casinos the "double zero") weight the odds in favour of the casino (and against the punter).

Mathematical literature is particularly rich in the field of probability paradoxes such as the example quoted last month. Usually the paradox depends on an ambiguous or misleading way of presenting the paradox. For instance, I might say that if two dice are thrown, a score of 11 can result in only one way — a five and a six — and a score of 12 also in only one way — a double six. From this the possibility of each is equally likely. Closer examination will reveal that this is not the case as a throw of of 11 is possible in *two* ways and *not* one! That is a five and a six, *or* a six and a five. Therefore there is twice the expectation of throwing an 11 than a 12. The following program illustrates this clearly by displaying all 36 possible scores obtainable with two dice:

```
10 FOR A=1 TO 6: FOR B=1 TO 6
20 PRINT A,B: NEXT B: NEXT A
```

A term much used in computing odds and probabilities is "factorial". The factorial of a number in the product of all integers up to and including that number, The factorial of six would be $1 \times 2 \times 3 \times 4 \times 5 \times 6$, or 720. Usually we say "factorial six" to denote this value. When writing this down the exclamation mark is used, so we would write: $6! = 720$.

Factorials are frequently used for computing the number of different permutations of objects. The competition in the March 1985 issue of *Dragon User* was to compute the number of possible arrangements possible with a standard pack of playing cards. Since the top card of the pack can be any one of 52 possible cards, the second card any one of the remaining 51 and so on down the pack, the total number of permutations of cards will be given by 52!, that is, $52 \times 51 \times 50 \times 49 \times \ldots$ The final computation is a staggering 68 digit number.

Perhaps more familiar is the type of competition which, for want of a better name, might be called the "cornflake" competition, due to the fact that they are frequently to be found on the packets of breakfast cereal. To enter, it is necessary to arrange a list of features (usually relating to the prize on offer) in correct order — or at least the order decided upon by a "panel of experts". As an example, if there were 12 features listed the number of possible permutations will be 12! — that is 479,001,600. In other words you would need to submit over 479 million entries to be certain of a winning line. Sometimes the competition is made a little easier if only the top eight features need to be listed — that is, the four least important features can be disregarded. In this case the calculation would be 12!/4! or 19,958,400, a reduction on the previous value, but still an enormous amount of stamp-licking to be sure of sending in a winning entry!

Occasionally, the actual order need not be specified, it being necessary to only name the eight features in any sequence. This increases our winning chances quite considerably as we can divide the previously computed odds by 8! — that is, factorial eight. The actual number of possibilities will now be: $12!/(8! \times 4!)$. Now there are only 495 combinations possible.

You should now be well prepared to tackle this month's competition problem: During stocktaking at the local toy shop, a tray containing 36 ordinary dice was knocked to the floor.

The dice scattered around, coming to rest with an assortment of faces on top. Can you determine what the odds would be of *all* 36 of the dice coming to rest with the sixes uppermost? For the answer we need to know the *exact* computation down to the last digit!

Prize

This month, we have a treat for all you martial arts fans — 20 copies of the Blaby hit, *Kung-Fu — The Master.* This game, in the ancient traditions of the Eastern mystic arts, allows you to meditate serenely on Life, the Universe and Everything — and then smash the living daylights out of a few Dragon sprites! All good clean fun.

Rules

To win a prize, you must first show the answer to this month's competition and how you solved it, with the use of a Basic program written on your Dragon. For the sake of our In Trays, please do not send in a cassette containing the program.

Make sure that your name and address are clearly printed on your entry — and don't forget to mark your envelope 'May Competition'. Envelopes without the magic words mysteriously disappear on reaching the Editor's desk.

And so to this month's tiebreaker; complete the following phrase in less than 10 words — 'I get a kick out of my Dragon because. . . .' As usual, preference will be given to the more inventive efforts.

February winners

In February, we were giving away Incentive games — and the lucky winners were as follows: Charles Daly of County Cork, Eire; Rhys Roberts of Porthcawl, Mid-Glamorgan; Justin Hewitt of Hixon, Staffs; Steven Woolhouse of Bromley, Kent; G. A. Hunt of Carnforth, Lancs; M. Armitstead of Basingstoke; Simon Aubrey of Swindon, Wilts; Olav Nielsen of Denmark; E. A. Newman of Addlestone, Surrey; Jon Sampson of Okehampton, Devon; F. J. Taylor of Acklam Road, Middlesbrough, Cleveland; Luis Martinez of San Sebastian, Spain; Rachel Edmunds of Sedgefield, Co Durham; P. D. Maddocks of Taplow, Berks; A. Wilson of BFPO 106. Congratulations one and all.

Solution

Finally, for those who still might be struggling away — the answer to the puzzle was — 840945 + 74316 = 915261.

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